TELEPHONE ENGINEER

Volume XVIII CHICAGO, NOVEMBER,

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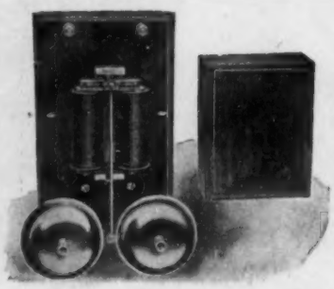

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Entered at Chicago Post Office as Second Class Mail Matter

Telephone Engineer

WITH WHICH IS CONSOLIDATED
The Western Telephone Journal
ESTABLISHED 1902

PUBLISHED MONTHLY BY
ELECTRICITY MAGAZINE CORPORATION
MONADNOCK BUILDING, CHICAGO, ILL.
Telephone: Harrison 3014—All Departments

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Per Year $2.00
Canada $2.50
Foreign 3.00
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VOL. XVIII CHICAGO, NOVEMBER, 1917 NO. 5

Call the Convention

ELEVENTH hour reports as we go to press give promise that the annual convention of the United States Independent Telephone Association will be held as usual. The Telephone Materials Priorities Committee (whose personnel and purpose are recorded elsewhere) is meeting in Washington, and will have a vitally important report to make to the association. The materials situation, and the steps taken to meet it, are but one of the newly developed reasons why the convention should not be postponed.

We are thoroughly familiar with the extraordinary condition that seems to demand the constant presence of every telephone man at his post. But we are unable to separate the convention duty from the operating routine. The greater the national emergency, the more the need for a meeting.

We hope to receive a confirmation of the convention dates, December 11 to 14, in a few days.

* * *

"Would I Have Invested?"

IT is of more importance that a public utility be reasonably attractive to capital than that it save the people a few cents per capita per annum. This is not a capitalistic doctrine as we utter it, but the only true measure of efficient operation and progressive development.

Leaving out all sentimental and socialistic considerations, it is better for the public that it pay too high a rate for its utility service than that it pay too low a rate. An inadequate rate must inevitably destroy any public utility in time. By its loss the public only gains, in savings on rates, an aggregate sum during the life of the utility of a few dollars per capita. Theoretically this sum would be fairly definite, regardless of the length of time required to accumulate it; for the greater the discrepancy between what the rate is and what it ought to be, the quicker the end will come.

Under regulation, too high a service rate resolves itself into a visible surplus, which may be regarded as still belonging to the people—to be expended for their benefit. Too low a rate becomes a growing deficit which also belongs to the people, and which they will ultimately pay in inconvenience or actual loss of service with consequent retardation of commerce.

Money must be expended for the manufacture of service. There is no way in which an amount inadequate for the purpose may be stretched to adequacy. There is no way in which dollars accustomed to earning six or seven or eight cents a year can be induced to work for two or one or nothing. Twenty-five thousand dollars is as much entitled to its four or five dollars a day as is labor. And if it cannot be assured its wage, it will not take the job.

Inability to secure capital for public utility operation is a public calamity, depriving the people of the fruits of civilization. And the whole responsibility for such a calamity rests upon inadequate rates.

Rates higher than necessary, on the other hand, are never a public loss under intelligent regulation. Restitution or compensation in some equitable form is always possible.

In a sentence, rates that are too high may be adjusted and compensated; rates that are too low are a permanent loss, an ineradicable deficit, a condition unremediable. Rate increases, founded on a basis of present equality, can never restore the losses of past inadequacy.

The first consideration of the commissions which regulate utility rates is the wage that capital must earn and receive. Without that proper and decent return, there can be no capital; without capital, no utility.

The leading question that each commissioner of public utilities should ask himself, when his decision must determine if present rates are adequate, is "Would I have invested? Is the return on investment in this property sufficient to attract my money, in competition with other proved investments?"

Would I have invested? It is a formula akin to the old philosophical rule, "Put yourself in his place." And the commissioner who feels impelled to answer it in the negative must acknowledge that something is wrong with the utility. If it is not good as an investment, it is certainly not good as a public service.

Whatever figure is in any wise indeterminate, that figure in practical use demands a factor of safety. So long as the elements of public utility service cost are not as exact and constant as the calculation of time, there must be a factor of safety in rate making.

"Would I have invested?" The question, asked in all seriousness and sincerity by the rate investigating commissioner of public utilities, will help to decide the adequacy of a service rate more quickly than reams of academic discussion. We recommend it to commissions as an informal but highly effective test of rates.

The Attitude of Labor in Emergency

OPPONENTS of labor unionism say that it not only holds its principles above patriotism, but that it takes advantage of situations calling for patriotism to gain benefits for itself. Labor leaders and men in the ranks of unionism, on the other hand, point to their sons in the service of the United States army, and say to some of their objectors, "You don't know what patriotism is."

Profiteering of the kind that inevitably accompanies national emergency, engineered by the type of men who can see nothing but advantage in opportunity, whatever its source, has done much to inflame labor and raise the union cry for recognition and wage increase. The profiteers, determined to continue their gains until the ultimate but slow-moving opposition of the people should stop them, in many cases granted the demands of their labor so that the machines of extortion might keep whirling. Then the contagion of organized labor's success carried over to the camps of normal industry, where there was no profiteering and no excess of revenue from which to meet uncalculating and unstabilizing demands.

In the telephone operating business there is, and can be, no profiteering. That also is true of a host of other industries, including all of the utilities. Labor which addresses its ultimata to these industries, therefore, places itself in an unfortunate light. The charges of disloyalty which have been, and are being, so freely uttered against organized labor all have their source in this superficial evidence of a desire to take advantage.

Secretary of Labor William B. Wilson, himself a member in good standing of a mining trades union and for forty-four years an ardent unionist, says to labor, "This is no time for insisting upon recognition of your union. This is no time to insist upon changes of standards. If you have been unable to secure recognition during normal times, if you have been unable to induce or compel certain standards that you believe you ought to have, under normal times, then YOU SHOULD NOT TAKE ADVANTAGE OF YOUR COUNTRY'S NECESSITIES; you should not endanger the future liberty of our people by insisting upon those changes at this time." And Samuel Gompers and other broad-minded labor leaders have said much the same thing.

Perhaps that appeal would be most effective which, in our national crisis, induced the trade unionist to view his situation in the light of his own reason and his country's welfare rather than through the lenses of organization—useful in normal times, but now wholly out of focus.

Capt. Mastin Taking Some of Co. E. 2nd Battalion Boys on a Practice March.

The Telegraph School.

Stringing Wires for Practice.

Communicating With Headquarters Three Miles Away.

Buzzer at Work.

Preparing to String Temporary Line.

On Their Way to Work.

Instruction in "The Service of Information" at Camp Monmouth—by Courtesy of the Telephone Review, the New York Telephone Company's House Organ De Luxe.

American Telephone in France

Information received at the offices of the American Telephone and Telegraph Company states that General Pershing's headquarters in France have been connected with all encampments and training quarters of the American army by a telephone system constructed by Americans. All materials except poles were shipped from this side.

Two battalions of the army men who built the first American telephone system on French soil were former employes of the Bell system. About 2,500 other former employes of the company are already in France with the army signal corps, or in mobilization camps awaiting orders to embark.

"It is a great treat for the officers to be able to talk through an American instrument instead of the types used on the continent," is the information received from abroad.

The rapidity and accuracy with which the Americans installed four telephone lines to Paris amazed their French cousins. Within five minutes after the orders were issued the men were at work on the job.

War Tax Reminder

Telephone companies are required to collect a war tax of five cents on each toll message, the charge for which is fifteen cents or over. This requirement is made in the war tax bill which became a law October 3, 1917. The sections of this law that refer to this tax are:

Section 500. That from and after the first day of November, nineteen hundred and seventeen, there shall be levied, assessed, collected, and paid * * * (e) a tax of 5 cents upon each telegraph, telephone, or radio, dispatch, message, or conversation, which originates within the United States, and for the transmission of which a charge of 15 cents or more is imposed.

Section 501. That the taxes imposed by section five hundred shall be paid by the person, corporation, partnership, or association paying for the services or facilities rendered.

Section 503. That each person, corporation, partnership, or association receiving any payments referred to in section five hundred shall collect the amount of the tax, if any, imposed by such section from the person, corporation, partnership, or association, making such payments and shall make monthly returns under oath, in duplicate, and pay the taxes so collected and the taxes imposed upon it under paragraph two of section five hundred and one to the collector of internal revenue of the district in which the principal office or place of business is located.

A. T. & T. Takes $5,000,000 Bonds

The American Telephone and Telegraph Company and its associated companies, forming the Bell system, subscribed on behalf of themselves and their employes for $5,000,000 of the second liberty loan. This subscription was allotted to localities or sections of the country in proportion to the quotas assigned by the treasury department to the various federal reserve districts.

Approximately $335,000 worth of the bonds are apportioned to the tenth federal reserve district of which Kansas is a part and of which Kansas City is headquarters.

The subscription of the Southern group, of which Colonel Gentry is president, amounted to $350,000; of this the Southern Bell Company and its employes subscribed $165,000 and the Cumberland Company and its employes $185,000.

The subscription for the Chicago district was split as follows: Chicago Telephone Company, $425,000; Michigan State Telephone Company, $150,000, and the Wisconsin Telephone Company $100,000.

Independent Changes in Ohio

The Independent telephone system of Nelsonville, with exchanges at Murray City and Carbon Hill, has been taken over by a newly organized Home Telephone Company, a part of the Athens County Home Telephone Company system. The new company has already taken over the management and operation of the three exchanges and is making extensive repairs and extensions leading to a betterment of the service.

The new officials of the company are W. E. Moler, Athens, president; J. G. Collins, Logan, vice president; W. L. Cary, Columbus, treasurer (Mr. Cary is also president of the Glouster Telephone Company); C. L. Jones, Athens, general manager. These men with P. W. Hickman, of Nelsonville, comprise the board of directors.

The newly formed company will be under the direct supervision of the Athens County Home Telephone Company, which now supervises twelve Independent exchanges in Athens and adjoining counties.

Canton Meet Talks Economy

Preferential telephone service for the United States government; war time taxation; and the high cost of operating were discussed by members of the Canton district, Ohio Independent Telephone association, meeting in the Courtland hotel October 10.

Members of the association went on record in favor of strict economy in telephone operation to the end that future rate increases may be kept to the lowest possible level.

Frank L. Beam, president of the state organization, in his annual report, declared government or municipal ownership as well as municipal composition to have been rendered impossible by the war. The financial condition of our larger cities, he said, is such that an effort to finance telephone operation would place them in danger of bankruptcy. The cost of new construction he placed at 60 per cent more than during normal times.

The meeting was welcomed to Canton by Manager Adelbert Graham of the Ohio State Telephone Company.

Columbus Municipal Movement

That municipal ownership and operation of telephones in Columbus, Ohio, proposed by the Municipal Ownership League for vote at the November election, is not defeated was stated by Councilman Alcott, speaking for proponents of the plan in the city council.

He said it failed to reach the ballot because it had not been sufficiently agitated and said backers plan a more vigorous fight at the next election.

Council voted to table indefinitely the telephone ordinance. It was reported unfavorably by finance committeemen. The measure proposed a vote on issuance of $300,000 bonds for erection of a telephone plant.

Merger Proposition in Venice, Cal.

Petitions are being circulated in Venice, Cal., asking the "powers that be" to act for a one-telephone system in that city. The Santa Monica Bay Merchants' Association is fathering the movement.

"TELEPHONIC TRANSMISSION LOSSES," by K. Ogana and T. Arakawa, the first installment of which was printed in the October number, will be concluded in a subsequent issue.

Raw Materials—Especially Copper

Independent Association's Manufacturer Members Take Action Against Threatened Shortage

THAT there will be, as the demands of government progress, a real shortage of many materials is becoming more and more evident. While the situation affects even those materials of indirect importance to the prosecution of the war, it applies directly to the commonly used metals, and particularly to copper.

In circumstances assuming the proportions of threatened emergency, a call was issued by Vice-President F. B. MacKinnon of the United States Independent Telephone Association for a meeting of manufacturers' representatives. The meeting was held October 19 at Hotel La Salle, Chicago, and was well attended, several operating officers of the association being present.

Mr. MacKinnon explained the regulations imposed by the Priority Committee of the War Industries Board of the Council of National Defense. In the order of priority "Class A" consumers represent the requirements of the government, and therefore, have first call for materials. "Class B" consumers are those whose activities are vitally necessary to public welfare, and whose demands for materials therefore will be met immediately the requirements of government emergency are satisfied. "Class C" represents the general run of business, and will be the one to suffer if shortages become stringent.

It was agreed that the first effort of telephone men, toward which they should bend all their energies, should be to establish their industry as a "Class B" consumer. While there seems to be little reasonable doubt of such a classification, it should be recognized that not even the railroads have definitely gained that division as yet. The Priorities Committee and its sub-committee on metals, of which Bernard Baruch is chairman, are working hard to bring order out of a complex situation, and are welcoming all the sincere assistance that industry can offer them.

Personal representation being necessary for proper consideration, the meeting voted to appoint a committee of eleven to wait upon the Priorities Committee and the metals sub-committee at Washington, to lay before them the claims of telephony as a Class B consumer, and to translate, for the governmental committees, miles of cable into terms of pounds of raw copper. This committee was appointed by President Robinson:

F. B. MacKinnon, chairman, Washington, D. C.; G. W. Robinson, St. Paul, Minn.; C. Y. McVey, Columbus, O.; A. F. Adams, Kansas City, Mo.; H. Linton Reber, St. Louis, Mo.; S. M. Heller, Louisville, Ky.; E. D. Schade, Johnstown, Pa.; F. H. Woods, Lincoln, Neb.; J. B. Edwards, Chicago; W. Roy McCanne, Rochester, N. Y.; and H. D. Critchfield, Chicago.

No representatives of the wire or cable manufacturers were appointed on this committee because they already have an active committee of their own, appointed for the same purpose, which doubtless will work in cooperation with the telephone men.

The committee, answering the call of its chairman, Mr. MacKinnon, is now assembled in Washington.

On the copper situation, Fred J. Hall of The Electric Cable Company says in the company's bulletin, "The Wire Message":

The oft repeated inquiry, "What price will the government fix for copper?" has been superseded since September 21 by the inquiries, "What is the market?" "What ought I to pay for copper?" The answer to the last inquiry is: "You ought to quote 23½ cents, but you cannot get it for that"; and to the first inquiry: "There is no market."

The expectation in some quarters that the fixing of the price by the government would relieve uncertainty has not been fulfilled. The reason is obvious when we consider the terms of the agreement made between the War Industries Board and the principal producers. It was arrived at late in the evening of September 20 and announced by the Committee on Public Information the next day. The price fixed is 23½ cents F. O. B. New York, subject to revision after four months. There was a strong impression that the price would be made 25 cents because of the purchase in August on behalf of our Allies of 77,654,000 pounds at the above figure. Announcement of this purchase was not made public until early in September. The principal points in the agreement are as follows:

1st. That wages are not to be reduced.

2nd. That our Allies and the public shall purchase at the same price as the government.

3rd. That measures shall be taken under the direction of the War Industries Board for the distribution of copper to prevent it falling into the hands of speculators who would increase the price to the public.

4th. That the proper departments of the government will take over mines and plants of any producers who fail to conform to the terms of the agreement.

The provision that the public shall be sold copper at the same price as the government has been strengthened by a statement of Mr. Ryan, president of the Anaconda Company. He is reported as saying that the price of 23½ cents goes into effect at once, and that it will eliminate the premium now being paid for spot copper.

"The proof of the pudding is in the eating." The fact is the general public cannot buy copper at 23½ cents. Large producers are not quoting on spot copper, and claim that they are sold out up to the first of the year, or that they must await fuller knowledge of government needs before entering into any contracts calling for the immediate delivery of the metal. It is reported that large producers are quoting 26 cents for delivery during the first quarter of 1918. This would indicate that they expect an upward revision of price at the end of the stipulated four months, and are not anxious to dispose of their product to the general public at 23½ cents. Immediately following the decision of the government, dealers in copper quoted 27 to 27½ cents for prompt delivery.

A provision in the agreement relating to the distribution of copper, if carried into effect, apparently means that dealers cannot in the future sell for better than 23½ cents. The effect of this would inevitably mean that dealers in copper will have to go out of business unless they obtain some special concession in price from the producers, who are apparently not inclined to make any concession.

The point has been raised that a consumer might be guilty of a misdemeanor in paying more than 23½ cents. This seems to us to be creating an unnecessary issue. We still maintain that the average consumer will have to pay whatever price is necessary to secure the metal or go without it. The price he pays will depend upon the supply over and above the needs of the government and its allies.

An important feature of the agreement is that which provides that wages will not be reduced. The avowed purpose of this is to prevent strikes and maintain maximum production. It is a wise provision if it accomplishes its purpose, but will it? Past experience has shown that the raising of wages in the copper districts has led to new demands enforced by strikes. This means that the cost of production is steadily increasing and that maximum output is impossible. Every one recognizes the fact that war has placed a heavy burden on productive labor, and wishes to see it well paid, and, if possible, satisfied. In stipulating that wages shall not be reduced the government has probably done all it can to accomplish this end, but we doubt that it will go very far in preventing strikes. To our mind the most effective action of the government in maintaining peace in our mining districts is the rounding up of paid German agitators who were the chief fomenters of trouble. The effect of their activities is shown in the following:

At one time during August, 1917, about 33⅓ per cent of

American productive copper capacity was idle. A comparison of the output from American refineries since June is significant. The following estimate is from the *American Metal Market*:

June—220,000,000 pounds.
July—200,000,000 pounds.
August—175,000,000 pounds.

A statement of Anaconda's output for the first eight months of this year tells a similar story, the output for August being the lowest for four years. From January to May, inclusive, it varied from a maximum of 31,300,000 pounds to a minimum of 25,000,000 pounds. The average for the five months was 28,450,000 pounds. The following table shows the loss of output in the Anaconda properties for June, July and August due to labor troubles:

Average output January to May, inclusive.....	28,450,000 lbs.
Output for June	20,400,000 lbs.
Output for July	12,400,000 lbs.
Output for August	11,775,000 lbs.

All estimates of the future value of copper are worthless so long as uncertain labor conditions prevail. Possibly this fact influenced the government in placing a limit of four months on the price of 23½ cents. So soon as the needs of the government for the near future are known, large producers will be in a position to arrange the distribution of their output, and the public may benefit by the release of copper that is being held against government demands. So far as the cost of metal to the average consumer is concerned, he has received no benefit up to the present time from the fixed price. It is difficult to see how he can receive any substantial benefit until production exceeds demand to a far greater degree than is apparent at the present time. The gradual lowering of the base price for insulated wires and cables, is due to natural causes. Some six or eight months ago the demand was greater than manufacturers could promptly meet. With the approach to more normal conditions a lowering of the base price was inevitable. It began before the question of a fixed price for copper became clearly defined.

We believe everyone understands the necessity for the government's action, and appreciates the justice of its decision and the eminently fair way in which it conducted its negotiations Nevertheless, we do not see how the general public will receive any immediate benefit.

Will Power and Success

Success and achievement do not lie at the end of the easy roads. A man who wants to be big and happy and of importance in the world must want to do hard things. He must have the wish, the will, to be up and ready for the fight each morning. And, if he has been taught by his school training that hard, disagreeable things can be conquered, think of his wonderful equipment to get on in the business of life!

It is idle to say that the men cannot develop their will power. The only man who cannot do this is the one who has run up the white flag and quit. He is the one who doesn't even try. You often hear the cry that a certain man cannot stop drinking. All fol-de-rol! I have known drunkards of thirty years' standing to quit drinking overnight, simply because they had found a motive for quitting.

There are others who say they cannot cut down their smoking. This is absolutely absurd. If a man tells me that seriously, I know he's either crazy or a quitter. To say that one who has been in the habit of smoking twelve cigars a day cannot cut down his supply to three a day is to state an obvious untruth. If he does not cut down he doesn't want to.

The man who spends a part of his time watching the clock does so because he really prefers to get out of the office or the shop rather than work. The fellow who always gets up late in the morning and has to run a race to reach his place of business on time, does so because he does not wish to exercise the small amount of will power requisite for him to get out of bed a few minutes earlier each day. The man who whines about his not being appreciated by his employer and not having his salary raised is usually the fellow who wants things by the easy route, not by the harder road of will power. He who complains that his business ideas do not receive sufficient reward is likely to be one whose business ideas are of no value, and whose will power is not exercised enough to enable him to discard the old ideas and think up new ones.—Dr. James J. Walsh, in *American Magazine*.

The Telephone Girl

When one sees the flag floating at half-mast over a public building his acquaintance with American tradition and sentiment instinctively suggests that a prominent personage has passed from earth—probably a high government official, a senator, a judge or someone whose long service for the public or whose good deeds or exemplary traits of character had lifted him above his fellows.

From 10 a. m. until sunset one Monday the Stars and Stripes floated above the Fulton County Court House at half-way down the mast, because someone beloved of those whose daily workship the building is had died, and was that afternoon being given back to earth. It was not a judge; not a long-trusted keeper of records; not a leader of the peace guardians; not a member of the bar, the silencing of whose eloquent voice might cast a pall of grief over the community.

It was the modest little lady who had manipulated plugs and stops at the court house switchboard!

It was the telephone girl who had died—whose sweet-tempered smile and whose happy "hello" were gone from the daily routine, to linger henceforward only in the hearts and memories of the county's servants, of whom she had been one.

Ordinarily the flying of the flag in mourning is an incident of no more than passing note, because it is done out of respect for the memory of a notable—someone who had been in the public eye.

But when such deference is shown by public officials out of sheer respect for the memory of an humble, honest working girl, simply because she had performed her duties well and faithfully, it is an event of more than casual interest and a subject of community pride.

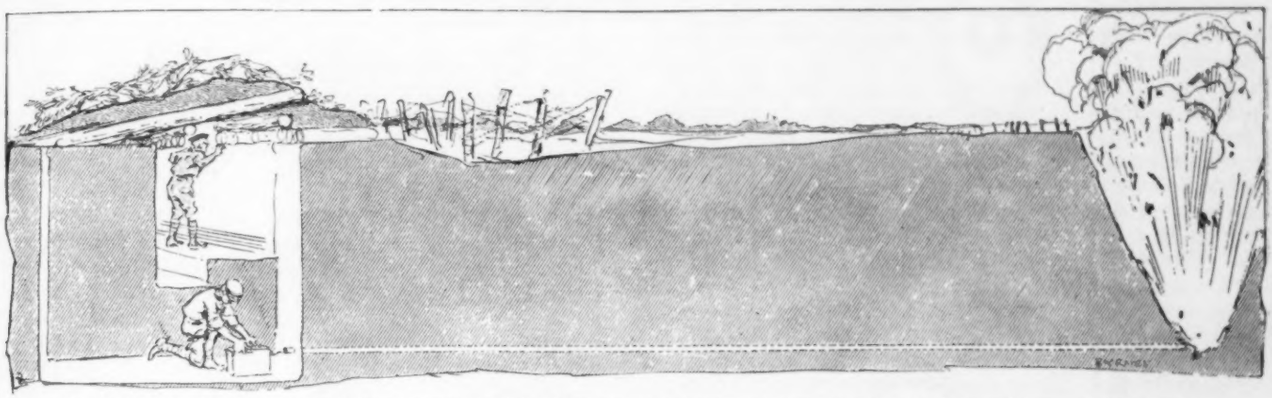
Somehow it inspires added respect for society and one's fellow-man when the court house flag floats just because the telephone girl has died!—*Atlanta Constitution*.

Germany Sends Photos by Wire

According to the *Annales des Postes, Telegraphes et Telephones*, Dr. Korn proposes to introduce his system for the telegraphic transmission of pictures on the Berlin-Vienna-Sophia-Constantinople-Bagdad route. For this purpose either telegraphic or telephonic connections could be utilized. So far as telephone connections are concerned, one could conceive stations at Vienna and Budapest in connection with Berlin, the lines being occupied for a quarter of an hour only. In these circumstances pictures of an event taking place in the afternoon could appear the next day in the Vienna journals. Transmission for longer distances (*e. g.*, from Berlin to Constantinople), would involve the use of telegraphic lines, which would enable an ordinary photograph to be transmitted in about an hour. The chief expense involved is the occupation of telegraph and telephone lines between such distances, but it is thought that the governments of the four countries concerned might grant very moderate rates if the lines were only used during hours when there is little or no traffic.

Blowing Up Ten Miles of German Trench

How a Telephone Tool Performed a Military Miracle, Described by "Southwestern Telephone News"



Comprehensive picture of how a "pipe of destruction" has been run to a trench and how the charge is detonated by an electric spark.

TELEPHONY is playing its part in the war as we all know. What the telephone-soldiers do in keeping open the lines of communication; by wiring newly-taken trenches; by operating in death traps on outpost guard and by building lance lines and installing field switchboards is a matter that has long since been discussed in detail.

But now comes the story about the successful use of a sapping machine that will interest the outside men, inasmuch as the telephone company was the pioneer in using this contrivance in America. And the instrument is nothing more than a pipe-forcing jack, such as construction gangs have used for years in driving three-inch pipes from one telephone pole to another or under a street. This does away with the necessity of digging a trench and greatly reduces the cost of operation.

The method of operating this jack is simple. First a trench must be dug to the depth at which the pipe is to be driven and long enough to accommodate the jack, the man or men operating it and the unit length, or section of pipe. When one of these sections has been forced forward into the earth, the jack is pulled back into the end of the rachet, a new section joined to the rear end of the buried pipe and the jack is again brought into play as before, a pumping or rocking movement of the lever forcing the jack onward.

A short piece of slightly larger pipe, called the "pilot" and having a cutting edge, is joined to the forward end of the leading section. The edge is keen enough to bore through roots and the like and can easily overcome the resistance of ordinary soil.

The pipe-forcing jack in operation. When one length of pipe has been driven forward, another can be put in its place.

And this now is one of the serviceable machines of war. It was by using a series of these pipe-forcing jacks that the British were able to explode that man-made volcano which erupted over a front of ten miles, between Ypres and Armentieres in the early dawn of a day last June, and utterly demolished that portion of the famous "Hindenburg line." Those Germans fortunate enough to escape from the awful cataclysm were so seized with fear that the British infantry swept over the craters in almost uninterrupted passage, and military men marveled.

They did not marvel as much at the immensity of the thing; they were not so astonished with the fact that thousands of tons of explosives had been employed, and that the operation had been carried out on the grandest scale known to history, as they were with the fact that the British were able to accomplish it.

"How," the layman asked, "did the British sappers carry out such an extensive program without being detected by the Germans?" The answer seems to be that Yankee ingenuity enabled the British to nullify every known means of detection. For the pipe-forcing jack is a Yankee invention.

And since the early part of 1916, powerful jacks, said to be equal to handling pipe six inches in diameter, have been made and shipped abroad. But pipe only four

inches in diameter and with unit lengths of 14 feet, have also proved effective and one of these units has an internal capacity of more than 2,000 cubic inches, in which space could be packed nearly 126 pounds of dynamite. In order to intensify the explosion, that section, of course, would have to be sealed at both ends.

A New York engineer foresaw the value of the pipe-forcing jack and in submitting his suggestion to the government, said:

"Why should the sappers, at a needless risk, try to dig their galleries the whole distance? Why not stop the tunnel work just outside of the detecting range of the listening microphones, say a distance of a couple of hundred feet away from the foe's position, and then force the explosives, packed in lengths of pipe, onward through the earth by means of these jacks?

"Of course it may be objected that if it is desired to place tons of dynamite, trinitrotoluol, etc., a single length of pipe holding between 125 and 200 pounds of explosive would not suffice. But what is to prevent the grouping of a series of charged pipes? With one pipe already forced to its goal, others could be pushed into place and arranged concentrically about it, and there is little doubt in my mind that the succeeding operations would be measurably facilitated by reason of the initial or pioneer pipe line. Not only would a procedure of this sort reduce the amount of excavational work, with its peculiar perils where the earth is permeated with water, but it would make it possible to lay both mines and countermines with great rapidity. I am satisfied, too, that the explosive charges could thus be shoved noiselessly to the desired points. The foe's first-line trenches could be dealt with in this way without preliminary tunneling—the only digging being short excavations to accommodate the jacks and the unit lengths of pipe employed. This work could be carried on from our advance trenches."

The illustration shows the methods employed by the soldiers. The photograph shows a telephone construction gang operating the jack.

Cleveland Meeting Discusses Costs

High prices for material and labor have prevented Independent telephone companies from profiting by war-time conditions, according to reports presented at the northern district meeting of the Ohio Independent Telephone Association, in the Electric building at Cleveland October 2.

While these companies show big increases in the number of telephones in use, advances in cost of lead, copper and other materials have not only kept profit down, but have, in a number of instances, been responsible, it was stated, for increases in telephone rates.

At this time, the president's report showed, telephone companies in the state own and operate more than $78,000,000 worth of property, and pay $1,500,000 taxes. There are approximately 780,000 telephones being operated, of which 465,000 are owned by Independents. This represents a gain of 750,000 telephones in twenty-two years, less than 30,000 telephones being in use back in 1895.

Two signal corps companies will represent the Ohio Independent telephone industry in the French trenches within a few months. These two companies were raised by the association officials, and include a number of former Cleveland telephone men. Additional signal corps units will be raised among the telephone workers as needed by the government. Close co-operation between Ohio Independent companies in furnishing the government with preferential telephone service was urged by C. Y. McVey of Cleveland, president of the Ohio State Telephone Company. At present government calls are given right of way over everything else by all companies.

Dayton Meeting Talks on Ownership

Sixty representatives of Independent telephone companies attended the Dayton District meeting of the Ohio Independent Telephone Association at the Ohio State Telephone building in Dayton October 5.

The meeting was for the fifth and sixth districts of the association and subjects covering the operation of plants formed the discussion, these being participated in by operators, accountants, managers and other employes and officials of the various companies.

There was no set program, the meeting being preliminary to the state convention of the association which is generally held in Columbus each year. Counties represented were Montgomery, Hamilton, Shelby, Champaign, Clarke, Darke, Greene, Logan, Madison, Miami, Preble, Warren, Brown, Butler and Clermont.

The question of municipal and government ownership competition was taken up by President Frank L. Beam, in his annual report. He declared that on account of the increased cost of construction any addition of telephone operation would jeopardize telephone companies' solvency.

C. Y. McVey, of Cleveland, president of the Ohio State Telephone Company, spoke on "Organization," advocating close co-operation between Ohio Independent companies in furnishing the government with preferential telephone service. More than $130,000 worth of bonds, he said, had been subscribed by employes of his company.

The representatives were welcomed to Dayton by A. W. Surrell, manager of the Ohio State Telephone company.

Fifty-five Meet in Central Indiana

The convention of the Central Indiana Independent Telephone Owners' Association was held in the Presbyterian church at Winchester, Ind., October 16. In the morning a school for operators was conducted by the Eastern Indiana Telephone Company, there being 65 chiefs and long distance operators in attendance. There was an attendance of fifty-five members of the association. The program was carried out as planned. One or two were not present to deliver their talk but sent papers. The operators were the guests of the Eastern Indiana Company for lunch which was served by the ladies of the Presbyterian church. There were several present from Greenville and Celina as guests of the association. This was reported to be one of the best meetings ever held by the association.

More of That Small Town Stuff

A jolly crowd of people who had assembled at the home of Mr. and Mrs. Harry Arbuckle in Hendricks township Tuesday night to enjoy a weiner roast came near ordering S. G. Huncilman, the Central Union telephone manager of this city, shot before sunrise, the result of a bit of unforgiveable carelessness on his part, and most people will admit that it would just about have served him right, for he stepped in the big pan of kraut that had been taken along as a part of the feast. Of course Mr. Huncilman was profuse in his apologies, but that didn't make the kraut smell any better.—Shelbyville, Ind., *Democrat.*

Accident Prevention in the Telephone Field

Address Delivered at the Sixth Annual Safety Congress, National Safety Council

BY J. F. NAYLON*

THE prevention of accidents in the telephone field, as in other fields, can be brought about only by the closest co-operation between the company and the employes. Both the company and the employes have a definite part to perform and if either fails to do that part the best results cannot be obtained.

In general, it is the company's part in the problem to provide a safe plant, good working conditions, proper tools, material and equipment and to educate employes to be thoughtful and careful in the conduct of their work.

It is the part of the employes to perform their work in a thoughtful, careful manner, to take no chances and to observe the company's rules.

Long before the operating companies undertook any Safety First campaign they realized that there was room for improvement in outside plant conditions. The first real step in that direction was that taken about 12 years ago, when it was decided that proper climbing space must be provided between pole pins on crossarms on poles jointly occupied by the telephone and electric light companies.

It was soon found that this was only a step in the right direction and a short time later the present practice of having electric light companies occupy the top position on all jointly used poles was started.

The work of reversing construction is practically completed. The danger of telephone employes' coming in contact with electric light wires has been reduced to a minimum, with a consequent reduction in the number of accidents.

The design of material, tools, and equipment has been given a great deal of consideration, so that the number of accidents resulting from defective material and tools is negligible.

The problem, therefore, is largely one of educating employes to be thoughtful and careful of their safety. This is particularly true of employes engaged in line work, a branch of the work which naturally carries with it a greater element of danger. It is true to a lesser degree of employes engaged in installation and maintenance work.

The educational work to which reference has been made is being conducted in accordance with the following general plan:

(1) The organization of accident prevention committees whose duties are to investigate all serious accidents, pass upon safety suggestions, make recommendations to improve conditions that might cause accidents, provide the subject matter for illustrated and other bulletins, and such other duties as may be pertinent to the subject of accident prevention.

(2) The distribution of bulletins, some illustrated, describing serious accidents that have occurred, the circumstances that led up to them, and how they could have been avoided. It is the practice to place bulletin boards in conspicuous places where men congregate in more or less large numbers, such as storerooms and terminal rooms.

There are, however, a great many men employed in telephone work who seldom or never have occasion to visit a storeroom or terminal room where they would have an opportunity to see and read bulletins.

For instance, the employes of some construction gangs, with the exception of the foreman, may not have occasion to visit a storeroom or terminal room for several months. It is of particular importance that these men have an opportunity to see accident prevention bulletins. Provision is made, therefore, so that each foreman receives a copy of the bulletins as they are published and he is required upon the receipt of a new bulletin to gather his men around him at some proper time, preferably during the noon hour, read the bulletin, discuss it, and if it happens to be a bulletin which has to do with his particular branch of the work, he is expected to go into it with his men in a great deal of detail and plan how to avoid a similar accident in his force.

There is one point in connection with bulletin boards that should be borne in mind and that is to see that they are placed in as conspicuous a place as possible and that they are properly lighted.

I recently had occasion to visit a plant where I noticed several bulletin boards that were very poorly located. In one case a board had been placed in a position where it was hidden by an open door a greater part of the time. Unless the bulletin boards are so placed that the men can read the bulletins without stepping up closely to them a great deal of the good effect of the bulletin is lost.

(3) A rigid periodical inspection of tools and the weeding out of tools that have become defective. In companies where all tools are furnished by the company it is a comparatively simple matter to keep defective tools out of the plant. It is, of course, more difficult in companies where the men furnish their own tools. In this case there is often a considerable difference in opinion between the company and the man as to when a tool is defective.

(4) The periodical inspection of poles unquestionably results in preventing a great many serious accidents. While no figures are available at this moment it is probable that if figures were available they would show that the number of accidents resulting from broken poles is very much larger among companies that do not make a periodical inspection than among companies that do make a periodical inspection.

(5) Periodical illustrated talks have been found to be a very impressive means of reaching the men most subject to injury. If possible, specialized talks should be given at frequent intervals to men employed in the various branches of the work. Employes are usually more interested in something that applies to their particular work than they are in something that is general in character. Talks of a general nature, however, have their advantages.

In building up illustrated accident prevention talks, there are several things that should be kept in mind, if the greatest benefit is to be derived from them.

Care should be used not to have the pictures overdrawn or farfetched. Pictures may be reproductions of accidents that have actually happened in the plant, reproductions of conditions that have nearly caused an accident, or of dangerous conditions that have been

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caught on the job during the regular progress of the work.

The talk should never be given by a person who is not thoroughly familiar with telephone work or who is unable to talk the language of the men he is addressing. This is particularly important because if he talks over the heads of the employes, much of the effect is lost.

(6) A very effective means of reaching men in the field is to have informal talks, given at regular intervals by a supervisor or department head, and so conducted that every man present will feel himself at home and loosen up and talk.

(7) We depend a great deal in our accident prevention work on suggestions and recommendations made by the men in the field, covering conditions that might cause an accident. If this phase of the work is properly conducted it will help a great deal toward the solution of our problem.

(8) Properly equipped first aid kits should be furnished so that they will be available for use by all the employes. In order to make certain that the contents of the kits are properly used, all employes should be trained in their use.

I wish to bring before you at this time a matter that in my opinion should be considered and discussed, not only in the telephone field but in other fields of work. I believe we are treading on more or less dangerous ground when we attribute nearly all preventable accidents to carelessness. Employes are very likely to resent being called careless, especially if there is any doubt about it. When resentment is aroused there will undoubtedly be difficulty in restoring employes to a receptive frame of mind.

It is the thought that all so-called avoidable accidents are due to one of the following three causes; namely, thoughtlessness, carelessness or recklessness.

If then, thoughtlessness, carelessness, and recklessness are such prominent factors in causing accidents, we should know the meaning of these terms. Since thoughtlessness, carelessness and recklessness mean, without thought, without care, and without reck, we shall first determine the meaning of these three terms. In the following are authentic definitions:

Thought—The act, process, or power of thinking, and the word think means to review in mind, examine mentally, consider.

Care—The state of being mentally oppressed as by anxiety or concern for some matter of interest or importance, often implying concern for safety. Care signifies watchful attention in view of possible harm.

Reck—To have a care or thought for; taking into consideration; heed.

Working upon these definitions as a basis we define:

Thoughtless as being without the act, process or power of thinking, without reviewing in mind, without examining mentally, and without considering.

Careless as without the state of being mentally oppressed as by anxiety or concern for some matter of interest or importance, often implying concern for safety, without watchful attention in view of possible harm.

Reckless as destitute of heed or concern for consequences, foolishly heedless of danger, headlong, rash, desperate.

From the standpoint of our problem and for the purpose of brevity we may select the following definitions:

Thoughtless—Manifesting lack of thought; without indulging in the process of thinking.

Careless—Without watchful attention in view of possible harm; light-hearted.

Reckless—Foolishly heedless of danger.

From these definitions it would seem that the reckless man, without exercising watchful attention in view of possible harm and without any mental action, that is without any thought or care on his part is fully aware of danger and, being thus aware of it, he acts in a manner which indicates that he is foolishly heedless thereof.

The careless man, on the other hand, occupies a position of full view of possible harm, but the harm or danger is only possible and is by no means certain. Being placed in this position the careless man does not exercise watchful attention to the end that the harm or danger may be avoided but he acts indifferently. Now this watchful attention which we would have him exercise signifies something quite different from what we mean by thoughtfulness; it signifies that we would have him place himself in the state of being mentally oppressed by concern for the safety of himself and his co-workers. This man, therefore, would be doing nothing more than exercising watchful attention for the safety of himself and others and without exercising the power of thinking.

This distinction can be made more clear by the description of what we mean by thoughtfulness.

A thoughtful man is he who exercises the power of thinking. A man may be heedful of danger, he may be careful to a degree and yet be absolutely thoughtless. To think a man must have the power of perception and conception and must exercise that power. By perception we mean the power of following lines of thought which are presented to the mind, and by conception the power of holding in mind the finished mental picture or idea resulting from perception.

To emphasize the distinction between the meanings of these terms we will cite a concrete illustration of extreme cases of recklessness, carelessness and thoughtlessness.

Imagine a freight car of the platform type standing on a siding, loaded high with telephone poles which are retained in position by strong stakes inserted along both sides of the car and fastened across the top by strong wire stays to prevent them from spreading. Now imagine that the stakes along one side have been removed, but that by chance the poles have become wedged together so that none of them roll off on the side where the stakes are removed. Apparently the poles lie there motionless, yet there may be going on an imperceptible slipping between the poles which at any instant may result in the poles starting to roll and crashing to the ground. Now, under these circumstances, picture a fellow worker, who is fully aware of the condition, walking on the ground along the side of the car from which the stakes have been removed and thus exposing himself to danger for an unimportant purpose and you have the picture of a reckless act.

A gang of linemen are erecting a 50-foot pole along a street in a densely populated tenement section. As the operation of hoisting the pole is in progress a large number of small children are attracted to the scene and occupy various positions which would prove fatal to a number of them if any part of the hoisting tackle were to break. Now picture to yourself that the foreman and gang in charge of this operation proceed with the work without compelling the children to remove to positions of safety, that they go on with the work lightheartedly and with indifference to the possible harm which may befall the children and you have the picture of a careless act.

Again let us assume that this same operation is in progress, with this distinction, the foreman and his men have exercised the greatest care by compelling all persons in the immediate location to occupy positions of safety and are themselves occupying safe positions as far as it is possible to do so and continue with the work. They are all deeply oppressed with concern lest possible harm should befall them. It so happens, however, that in the harness of the team that furnished the hoisting power there is a somewhat concealed but very serious defect. A mental inventory of the elements of danger in connection with the operation would lead to the inspection of the harness, but to make a mental inventory would be to think. In this case, however, the gang, while being extremely careful, does not make a mental review of the elements of danger and, therefore, does not become aware of the fact that danger is lurking treacherously near. Picture this condition and you have the picture of a thoughtless act.

From the foregoing it would appear that it is wrong to jump at the conclusion that the majority of avoidable accidents are caused by carelessness. It would also appear that in the progress of our educational work we should keep in mind the fact that we have the factors of thoughtlessness, carelessness and recklessness to consider.

The question of penalizing the thoughtless, careless or reckless man who is not injured as a result of thoughtlessness, carelessness or recklessness is one that should be given serious consideration.

Care should be used, however, in the event of any action being taken, to make the punishment fit the crime.

After all is said and done the prevention of accidents in the telephone fields, as in other fields, can be brought about only by the closest co-operation between the company and the employes.

To Resist South Bend Merger

A fight is threatened between the Independent telephone interests and the Bell interests at South Bend, Ind., over the proposed purchase of the South Bend Home Telephone Company by the Central Union Telephone Company. It is asserted by the Independents that this will be in violation of the agreement between the vice-president of the parent Bell system and the attorney-general of the United States, entered into in December, 1913. This agreement by the Bell officials was for the purpose of stopping prosecution by the government for violation of the anti-trust laws.

The Independents announce that they are determined to make a fight and to test the agreement entered into with the attorney-general of the United States. The Independents through their state organizations in Indiana and Michigan, which are most directly affected by the South Bend move, have already served notice on the Indiana Public Service Commission that they desire to be heard on any proceedings in the South Bend case.

The Indiana association, as a first step, has adopted the following resolution:

Resolved, That the Indiana Independent Telephone Association shall oppose as effectively as possible the purchase by the Bell telephone system or allied interests of Independent or locally owned property, for the reason that such purchase would be against public policy, as declared by court decisions and law, would be in conflict with agreements between the officials of the Bell telephone system and the attorney-general of the United States, and would tend to extend the Bell monopoly to the detriment of competition under local and Independent ownership.

The Home Telephone Company and the Central Union Telephone Company have offered an ordinance to the city council of South Bend asking for the merger of the companies. The plan is for the Home company to sell out to the Central Union.

There is little chance of the deal actually being consummated for some time, according to the statement made by Elmer E. Daicey, manager of the Home company.

"It is true that we want to dispose of the business," said Mr. Daicey, "because the business has been a losing proposition, but I want it understood by the public that if an agreement of sale is reached between the two companies, there could not possibly be a complete merging of operating equipment of the two plants within the next two years owing to the vast amount of work that would be necessary in the engineering department.

"The first move that this company made toward disposing of the plant to the Bell company was a year ago last July, at which time we were losing about $1,000 a month. Mr. Bonds, manager of the local company of the Bell system, informed me that his company would consider purchasing our plant provided we would deposit the stock certificates in a certain bank. Each of our stockholders was advised by letter of the contemplated sale and offered 70 cents on the dollar for stock held by them. Many absolutely refused to consider our proposition, assuming the attitude that if the stock were worth that to the company they would eventually get more by holding out.

"E. T. Bonds of the Central Union came to me with a prepared statement of the proposed merger, to be given to the newspapers for publication, but the suggestion was voted down by the board of directors, which met later in the day, as being untimely, for the reason that the announcement being made before the deal had really been made might mislead some of our subscribers and make our collections difficult. The beans are spilled now, and it is no more than fair now that the public should know the situation.

"As to the published statement that the first of the coming year would see the Bell company serving the entire city of South Bend and St. Joseph county, I wish to say, that even if we sell to the Bell company the two systems could not be consolidated within two years.

"A sale of the property would be much better than for us to go into the hands of a receiver.

"What will be the outcome of the negotiations between the two companies I am as far from answering as anyone, but I am frank to say that we are hoping that we will be able to bring our stockholders to our way of seeing the matter and dispose of the stock they hold to the company at the price offered. That is the only thing that is delaying the closing of the deal."

More Wires Out of Milwaukee

Additional telephone circuits between Milwaukee and Oshkosh and between Milwaukee and Appleton are provided for by an appropriation of $17,500, recently authorized by the Wisconsin Telephone Company.

This construction work is made necessary by the steady increase in traffic. It involves placing of poles, stringing of wire and additions to the switchboards in the central offices.

The new equipment is expected to provide adequate telephone facilities for some time to come and will be ready for service during December, 1917.

Besides the work planned by the Wisconsin Telephone Company, the American Telephone & Telegraph Company is to build additional circuits between Milwaukee and Chicago in order to complete direct circuits between the latter city and Appleton and Oshkosh.

The Necessity for Better Accounting

Paper Read Before the Minnesota Independent Telephone Association

BY H. B. WARREN*

THE necessity for better accounting is a matter which is causing the Minnesota Railroad & Warehouse Commission serious concern. The accounting conditions in the telephone industry in the state have astounded us to such an extent that we wonder that many of the companies have existed.

Accounting is a book record of all the operations of a business. Without such a record a business has no means of knowing what it has done, what it is doing or what it may hope to do. In such a condition what business may expect to prosper?

A few thoughts on the elementary principles of telephone accounting may help the smaller companies to understand the necessity for better accounting and why the commission is insistent upon this feature of its telephone work.

The Minnesota Telephone Act requires that the commission perform regulatory functions as to the rates and practices of the telephone companies. This legislation was enacted as much for the protection of the telephone companies as the public, and that the commission may intelligently perform its duties it is necessary that it obtain certain information, at regular intervals, as to the financial condition of each telephone company operating in the state. For this purpose the commission issued its "Accounting Circular, No. 51," which contains full instructions for the proper accounting by small telephone companies. Strict adherence to these instructions will result in each company having a correct record of all its business transactions. We find that a comparatively small number of telephone companies in our state have an intelligible accounting system.

Without proper accounting a company is unable to determine the net result of its management. It is unable to determine whether it receives everything that it is entitled to receive and cannot know what it gets for the money it spends. Very few companies have a record of the money expended separated as between expenditures for construction and expenditures for maintenance. It is most essential that such a record be properly kept, as the construction charge represents the capital invested in the plant upon which the company is entitled to a fair interest return, and without such a construction cost record it is impossible to determine whether the company is earning a fair return on the capital invested. It is necessary, also, that the sources of the amount invested in the plant be shown, that we may know how much of it was derived from surplus earnings of the company and how much from new capital. Such information can be obtained only through a proper accounting method.

Another necessity for better accounting is the proper treatment of depreciation. Every telephone company should regularly charge a portion of its earnings to "Depreciation Expense" and credit the same amount to "Depreciation Reserve," charging to the "Reserve" any retirements or reconstruction of the plant on which the reserve was accumulated. This is done to create a fund to perpetuate the existence of the plant, and failure to do so will eventually result in a plant being completely worn out and no money to replace it. Such a condition may be averted by a proper depreciation accounting.

Do you know if you are receiving all the earnings to which you are entitled? Are you furnishing exchange service to some one not on your books? Are you charging all the toll calls to your subscribers? Are you paying the connecting toll lines for tolls that you are not collecting from your subscribers? Are you performing any special service for which you fail to collect your earnings? How can you be sure of any of these things unless you have a good accounting system and bring it to a balance at regular intervals? We have found instances of a company, because of loose accounting methods, losing track of subscribers, thus furnishing service for which no earnings were collected, and we have more frequently found instances of toll charges not being made to subscribers. Such a condition should not, and with a proper accounting method, could not exist. It results in a loss to the company and furnishes the commission with erroneous information as to the financial condition of the telephone company.

It is further necessary that a correct record be kept of the expenses properly classified. A company should know how much it spends for maintenance and against what part of the plant the maintenance applied. This is important to the companies as it informs them of the trend of expense over a period of years, thus enabling them to determine which parts of the plant are subject to the greatest wear. By keeping close watch of these conditions the company may learn where better construction would save money.

In order that the commission may properly regulate the telephone companies, and adjust such matters as come before it, such information as we have suggested is necessary. The keeping of such records is not as difficult as some of the companies seem to think, nor is the value of it appreciated until the results appear. We must insist that all companies in the state get started along the proper lines without delay. The facilities of the commission's office are always at their service and they are expected to call upon it for assistance.

* Chief of the Accounting Department, Minnesota Railroad and Warehouse Commission.

Philadelphia-Atlantic City Cable

An aerial storm-proof telephone cable, said to be comparable with the best underground service in the country, has been established between Philadelphia and Atlantic City by the Bell Telephone Company.

The new aerial cable, which entailed an expense of $600,000, involved the erection of 342,000 feet of cable weighing 792 tons, and the placing of 263,000 duct feet of conduit at the Atlantic City end, where the approach to Absecon Island was made by subway.

With the completion of this cable, the extent of absolutely storm-proof toll service from Philadelphia embraces, in addition to the Atlantic coast cities reached by the Baltimore-Washington subway, all of the territory suburban to the city as well as the Main Line to Malvern, Norristown, Chester, Wilmington, Ambler, Bristol, Trenton, Camden, Woodbury, Riverside and the New Jersey seashore city that is now added.

Discrimination in Telephone Rates

Paper Read Before the Minnesota Independent Telephone Association

BY J. W. HOWETT *

ONE of the most important duties of the Minnesota Railroad & Warehouse Commission in its regulation of telephone utilities within the state, is to eliminate, as far as possible, various abuses and evils, which place one or more classes of subscribers at a disadvantage or inequality in the matter of rates with other subscribers. This general matter of discrimination in telephone service has engaged the attention of all state public utility commissions and has been the subject of considerable legislation. The Minnesota Telephone Act includes the following sections bearing directly on this subject.

Section 7—Discrimination Prohibited—No telephone company or any agent or officer thereof shall directly or indirectly in any manner whatsoever, knowingly or willfully, charge, demand, collect or receive from any person, firm or corporation, a greater or less compensation for any intrastate service rendered or to be rendered by it than it charges, demands, collects or receives from any other firm, person or corporation, for a like and contemporaneous intrastate service under similar circumstances

Section 11.—Free or reduced rates to officers—A telephone company may furnish service free or at reduced rates to its officers, agents, or employes in furtherance of their employment, but shall charge full schedule rates without discrimination for all other service.

It will be seen from the foregoing that the Minnesota law is very explicit.

The chief forms of discrimination in telephone rates in Minnesota may be summed up as follows:

Preferential rates to stockholders.

Free service to clergymen and others.

Equal rates for party line service as for individual line service.

Extra charge for long distance message terminating on a rural line.

Supplying business telephone service at residence rate.

Favoritism to certain classes of business men.

The state law expressly forbids any discrimination in telephone rates and stockholders of telephone companies, whether mutual or stock companies, are on an equal footing with other patrons of the company. The rates should be equal to all and the returns or advantages to stockholders should come in the shape of dividends rather than in preferential rates. One concern in this territory has a rate of $1.90 a year to stockholders and $12.00 a year to non-stockholding subscribers. Such a schedule is bound to provoke general dissatisfaction. A telephone plant, first of all, must be maintained in good condition and the rates must be adequate to cover the cost of maintenance. If there be any surplus, then it is proper to declare dividends to the stockholders. It has been my observation that telephone companies operated under a preferential schedule of rates very often are poorly maintained and the explanation is obvious.

Free telephone service to anyone is prohibited by the laws of the state and yet many schedules now in force give free service to clergymen, to railroad stations and various others. In the matter of railroads the Minnesota Railroad & Warehouse Commission has undertaken to require railroad companies to install telephones at such railway stations as public necessity might demand. Up to date the commission has received 41 formal petitions requesting it to have telephone service established at respective stations. In every case the railroad company has complied with the petition when attention has been called to it by the commission.

Many companies in Minnesota are charging the same rate for a party line service as for an individual or private line service. It should be evident that the subscriber on a party line does not obtain as desirable service as one on a private line. There is a distinct favoritism toward the latter, although it may not necessarily be intentional. Some of our companies make a practice of exacting an additional charge for incoming long distance messages terminating on rural lines but without demanding such a charge when the long distance message originates on the rural line. A telephone rate between two points should be the same either way, and it is a distinct discrimination forbidden by law to have a higher rate in one direction than in another over the same line between the same points.

Several telephone companies require applicants for telephone service to become stockholders of the company as a requisite for obtaining service. As very few, if any, maintain a strictly mutual organization and as practically all telephone companies in this state are public utilities, a rule requiring prospective patrons to become stockholders is unjust and not permissable under the laws of the state. Wherever a company has broken away from a strictly mutual basis and rented its telephones even to one party, for even a limited period, the ice has been broken and the company cannot enforce a rule requiring membership in the company as a requisite for obtaining service.

Many business men and business women are obtaining business telephones at the residential rate. It may be difficult, possibly, to distinguish between business and residence service when the telephone instrument is installed in the home, but a safe rule for a local manager to observe is to ascertain the main purpose for which the instrument was installed. The use and not the location of the instrument determines its service classification. A lawyer, a physician, a nurse, a seamstress, a veterinary surgeon, for example may conduct his or her profession, or business from their home, but this does not entitle the subscriber to a residence rate. The use and not the location of the telephone must govern the rate.

In this connection it may be stated that certain companies attempt to make a distinction between the various classes of business houses. For instance, a real estate dealer or a lawyer having comparatively few calls a day is given a lower monthly rate than a grocery store or other mercantile establishments, which presumably will have a great many more calls. This is not permissable under the laws of Minnesota. Business is business and the law permits no separate classification of business telephones. Some day, perhaps, the rates may be based on the number of calls and a measured service schedule be installed in place of the present unlimited service. But until that time arrives such a classification is discriminatory.

*Supervisor of Telephones, Minnesota Railroad & Warehouse Commission.

The Situation in European Capitals

A Resume of Reports Gathered by the Transmitter, of Baltimore

TELEPHONE people everywhere know something of the conditions in our industry caused by the entry of the United States into the great war. Thinking beyond our own immediate problems, some of us have been wondering what has happened to the telephonic development in the capitals of Europe, only to learn, as might be expected, that there isn't a great deal of information available on the subject. We have been able, however, to obtain some general and a few particular facts regarding foreign conditions and print them with the hope that they may prove useful to our people in the field.

Shortage of labor and materials with the accompanying high prices of materials have been marked features of the situation in London, Paris, Berlin and Vienna, the capitals of the principal European belligerents. In all cases telephone rates have increased and in all cases except London the number of subscribers has decreased. In London the number of subscribers at the present time is approximately the same as at the outbreak of the war.

The immediate effect of the war in Copenhagen, Stockholm, Christiania and Berne, the capitals of the principal neutral countries, was a great decrease in the number of new subscribers. But by the latter part of 1915 the number of new subscribers had again become normal, and in all cases except Christiania the year 1916 saw the greatest net gain in subscribers in the history of the systems. In Christiania the number of applications for service has been so great that a practical embargo on new installations has been declared. Rates have been slightly increased in both Christiania and Berne.

At the outbreak of the war the immediate effect in London was to hold the number of subscribers practically stationary; but by the middle of 1915 the number of applications for service had increased to a point where they could not possibly be filled by the depleted staff. So as to limit the number of applications, it was therefore decided in September, 1915, to impose a substantial surcharge on all new installations. This surcharge has had the effect of reducing the number of applications by approximately 50 per cent. Taking into account the number of discontinuances, the net result is a total number of stations that remains practically stationary.

All toll service in France was suspended with the coming of the war, and the number of subscribers in Paris fell off considerably. By the middle of 1915 toll service was again permitted between Paris and parts of France more or less remote from the war zone. But it is believed that the number of subscribers has not increased. Beginning January 1, 1917, the Paris rate for service was raised.

It is understood that the immediate effect of the war in Berlin was a considerable decrease in the number of subscribers, and it is doubtful if any of this decrease has since been recovered, especially in view of the fact that on August 1, 1916, all local telephone rates were increased.

Little definite information regarding the situation in Vienna is to be had, but the general facts may be surmised. It is known, for one thing, that local telephone rates have been raised.

In Christiania the following announcement as to the telephone situation was made in the latter part of 1916:

"The Christiania Telephone Exchange announces that, since the war has prevented the procuring of the telephone material needed for the construction of new plant, applications for new connections cannot be received until further notice.

"The Exchange will endeavor to fill such applications as are already on hand insofar as the material in stock permits, but no announcement can be made in advance as to the prospects of installing any particular connection.

"Nor can it be expected that removals from the city or into the city will be carried out in every case, and in no case will a residence telephone be changed to a business telephone."

Regarding the work of the telegraph and telephone companies in improving United States Government communication between army cantonments, aviation fields and naval bases, Daniel Willard, general supervisor of the Committee on Telegraphs and Telephones of the Council of National Defense, has issued a statement, excerpts of which are as follows: "It is a striking tribute to the science of communication that a country so vast can be knit so closely together as the United States is at present by its telegraph and telephone lines. Despite obstacles which seemed at times insuperable, the government's emergency requirements have been met. The formation of more than 14 reserve battalions for the Signal Corps from the telephone and telegraph companies is rapidly nearing completion. The majority of the units have been recruited practically up to full strength and nearly all of the officers have received their commissions. Several battalions are already in camp receiving intensive training under officers of the regular army.

"Wherever government construction projects are going forward the telephone and telegraph systems have been called in to place them in quick contact with the department centers. As soon as the location of all of the national army cantonments had been definitely decided upon, the work of providing adequate facilities was started. The work on the coast guard telephone lines is being continued actively in all sections where construction or repair work has been requested. The work of the telephone and telegraph companies touches the war at every point, and the effective service which they have rendered already to the government sustains the reputation for accomplishment which American science and business has always possessed."

A. T. & T. Excess Profits Tax

It is believed probable that American Telephone will have to pay little if any excess profits tax under the law, as agreed upon by the Senate and House conferees, says the Boston *Post*. This will, of course, depend upon the interpretation of just what is the company's invested capital. In 1916 American Telephone earned 6.17 per cent on its "plant and other assets," and it is assumed that these will be figured as invested capital. Under the law the company is allowed an exemption of at least 7 per cent on its invested capital. It is possible, however, that some of the subsidiary companies may have to pay a small amount of excess profits taxes.

Railroad Crossings

Specifications Prepared by the Public Service Commission of Pennsylvania

[Note:—For the purpose of these specifications, circuits or conductors will be designated by class, as follows:

Class.

A { A-1—Constant potential, alternating current, not grounded, exceeding 5,000 volts and not exceeding 7,500 volts.
A-2—Constant potential, one side or neutral grounded, exceeding 2,500 volts alternating current to ground, but not exceeding 3,750 volts alternating current to ground, or exceeding 750 volts, nominal, direct current to ground, excepting trolley contact wires. (Trolley feeders may be classed either with trolley contact wires of corresponding voltage or with other power circuits of the same voltage and character.)
A-3—Constant potential, alternating current, exceeding 7,500 volts between conductors when circuit is not grounded, or exceeding 3,750 volts to ground when circuit is grounded.

B— Constant potential, not exceeding 5,000 volts alternating current, when circuit is not grounded, or not exceeding 2,500 volts alternating current to ground when circuit is grounded, or not exceeding 750 volts, nominal, direct current to ground when circuit is grouded (excepting trolley contact wires), and constant current series arc or incandescent lighting.

C— Communication, including telephone, telegraph and signal circuits not exceeding 750 volts, excepting those included in Class P.

D { D-1—Trolley contact wires not exceeding 2,500 volts alternating current, or not exceeding 750 volts, nominal, direct current.
D-2—Trolley contact wires exceeding 2,500 volts, alternating current, or exceeding 750 volts, nominal direct current.

P— Telephone, telegraph or other signal wires not exceeding 750 volts used by the owners or operators of Class A, Class B or Class D circuits, but not for the use of the public.

(Where Class P circuits throughout are in conformity with the requirements of these specifications for Class C circuits, the Class P conductors in the crossing span shall be treated as Class C.

Where Class P circuits throughout are not in conformity with the requirements of these specifications for Class C circuits, the crossing span shall be so constructed that the degree of hazard shall not be materially increased due to the presence of Class P circuits.)

SCOPE

THESE specifications apply to crossings of Class C and Class P lines over tracks of railroads and their associated Class C or Class P wire lines in the same span. If Class C or Class P lines cross Class A, B, or D lines and railroad tracks in the same span, the Class C or Class P lines shall, where practicable, be below the Class A, B, or D lines; however, if necessary for Class C or Class P lines to cross over railroad tracks, and Class A, B, or D lines in the same span, the crossing, insofar as mechanical strength of construction is concerned, shall be in accordance with other specifications governing such conditions.

GENERAL

Location of Poles. The poles supporting the crossing span and the next adjoining span, where practicable, shall be located in a straight line.

Falling Trees. The crossing span and the next adjoining spans, so far as practicable, shall be kept free from trees which might fall into the line.

Fire Hazard. The poles of the crossing span, so far as practicable, shall be located away from inflammable material or structures.

Length of Span. The length of the crossing span shall be as short as practicable, and in general shall not be greater than the normal span of the line. No crossing span should exceed 150 feet in length. The length of the next adjoining spans, where practicable, shall be not greater than one and one-half (1½) times the length of the crossing span.

Grading. Whenever practicable, the difference in elevation of the wire supports, at the crossing poles and the poles next adjacent, shall not be greater than five feet. It is desirable that this difference of elevation be less than five feet.

CLEARANCES

Clearance of Poles. Unless physical conditions or municipal requirements prevent, the side clearance between the poles of the crossing span and the nearest track rail shall not be less than twelve feet, except that at sidings a clearance of not less than seven feet may be allowed. At loading sidings sufficint space shall be left for a driveway.

The poles of the line making a crossing shall be so located that no interference with the existing lines, or with the free use of the poles, shall result.

Clearance Over Rails. The vertical clearance between the conductors of the crossing span and the top of the rail shall, under normal conditions (sixty degrees Fahrenheit and no wind or ice loading), be not less than twenty-seven feet.

Clearance Over Wires. The vertical clearance between conductors of the crossing span and conductors of the span crossed, where carried on separate poles, shall under normal conditions (sixty degrees Fahrenheit and no wind or ice loading), be not less than four feet.

Spacing of Conductors. The separation of conductors in the crossing span shall preferably be not less than twelve inches, but in no case less than six inches. Not more than ten wires shall be supported by one set of double arms.

Vertical Spacing of Conductors. The vertical clearance between conductors supported on the same pole or structure shall preferably be twenty-four inches, but in no case less than twelve inches. (Note:—The requirements of the last two paragraphs do not apply to conductors in cable or to twisted pair wires.)

POLES

Quality of Poles. Wooden poles supporting the crossing span shall be of chestnut, or other selected timber, and shall be sound and reasonably straight. They shall conform to the specifications for the proper class. The several classes shall be used as follows:

For poles carrying not over 20 wires—Class C poles;
For poles carrying more than 20, and not more than 40, wires —Class B poles;
For poles carrying more than 40, and not more than 80, wires —Class A poles.

SPECIFICATIONS FOR WOOD PO ES, NATIONAL ELECTRIC LIGHT ASSOCIATION

CHESTNUT POLES.

To determine the character of poles to be used, pole lines may be divided into the three following classes:

Class "A": For heavy transmission lines or heavy distribution lines.

Class "B": For light transmission lines or ordinary distribution lines.

Class "C": For very light distribution lines or light secondary lines.

The purchasing company is to have the right to make such inspections of the poles as it may desire. The inspector of the purchasing company shall have the power to reject any pole which is defective in any respect. Inspection, however, shall not relieve the manufacturer from furnishing perfect poles.

Any imperfect poles which may be discovered before their final acceptance shall be replaced immediately upon the requirement of the purchasing company, notwithstanding that the defects may have been overlooked by the inspector. If the requirements of these specifications are not fulfilled when the poles are offered for final acceptance, not only shall the purchasing company have the right to reject the poles, but the expense of inspection of such defective poles shall be borne by the manufacturer.

All poles shall be subject to inspection by the purchasing company, either in the woods where the trees are felled, or at any point of shipment or destination. Any pole failing to meet all the requirements of these specifications may be rejected.

All poles shall be of the best quality live white chestnut, squared at both ends, reasonably straight, well proportioned from butt to top, peeled and with knots trimmed close.

The dimensions of poles shall be according to the following table:

DIMENSIONS OF POLES IN INCHES

Length of Poles (feet)	Class "A" Top	Class "A" 6 ft. from butt	Class "B" Top	Class "B" 6 ft from butt	Class "C" Top	Class "C" 6 ft. from butt
25	24	37	22	33	20	30
30	24	40	22	36	20	33
35	24	43	22	40	20	36
40	24	45	22	43	20	40
45	24	48	22	47	20	43
50	24	51	22	50	20	46
55	23	54	22	53	20	49
60	22	57	22	56		
65	22	60	22	59		
70	22	63	22	62		
75	22	66	22	65		
80	22	70	22	69		
85	22	73	22	72		
90	22	76	22	75		

the "Top" measurements being the circumference at the top of the pole, and the "Butt" measurement being the circumference six feet from the butt.

SPECIFICATIONS FOR EASTERN WHITE CEDAR POLES

The material desired under these specifications consists of poles of the best quality of either seasoned or live green cedar of the dimensions hereinafter specified. Seasoned poles shall have preference over green poles provided they have not been held for seasoning long enough to have developed any of the timber defects hereinafter referred to. All poles shall be reasonably straight, well proportioned from butt to top, shall have both ends squared, the bark peeled and all knots and limbs closely trimmed.

DIMENSIONS

The dimensions of the poles shall be in accordance wtih the following table, the "top" measurement being the circumference at the top of the pole, and the "butt" measurement the circumference six (6) feet from the butt.

MINIMUM DIMENSIONS OF POLES IN INCHES (CIRCUMFERENCE)

Length of Poles (feet)	Class "A" Top	Class "A" 6 ft. from butt	Class "B" Top	Class "B" 6 ft from butt	Class "C" Top	Class "C" 6 ft. from butt
25	24	36	22	32	18¾	30
30	24	40	22	36	18¾	33
35	24	43	22	38	18¾	36
40	24	47	22	43	18¾	40
45	24	50	22	47	18¾	43
50	24	53	22	50	18¾	46
55	24	56	22	53	18¾	49
60	24	59	22	56	18¾	52

When the dimension at the butt is not given the poles shall be reasonably well proportioned throughout their entire length.

The dimension requirement at the six foot mark shall be rigidly followed in all cases. Class "A," "B," and "C" poles may have top circumference not more than one-half inch less than those shown in the preceding table. No pole shall be over six inches longer or three inches shorter than the length for which it is accepted; if any pole be more than six inches longer than is required, it shall be cut back.

QUALITY OF TIMBER.

Dead Poles. The wood of a dead pole is grayish in color. The presence of a black line on the edge of the sapwood (as seen on the butt) also shows that a pole is dead. No dead poles, and no poles having dead streaks covering more than one-quarter of their surface shall be accepted under these specifications. Poles having dead streaks covering less than one-quarter of their surface shall have a circumference greater than otherwise required. The increase in the circumference shall be sufficient to afford a cross-sectional area of sound wood equivalent to that of sound poles of the same class.

Fire Killed or River Poles. No dark red or copper colored poles, which when scraped do not show good live timber shall be accepted under these specifications.

Twisted, Checked or Cracked Poles. No poles having more than one complete twist for every twenty feet in length, no cracked poles containing large season checks shall be accepted under these specifications.

"Cat Faces." No poles having "Cat faces," unless they are small and perfectly sound and the poles have an increased diameter at the "cat face," and no poles having "cat faces" near the six-foot mark, or within ten feet of their tops, shall be accepted under these specifications.

Shaved Poles. No shaved poles shall be accepted under these specifications.

Miscellaneous Defects. No poles containing sap rot, evidence of internal rot as disclosed by a careful examination of all black knots, hollow knots, woodpecker holes, or plugged holes; and no poles showing evidences of having been eaten by ants, worms or grubs shall be accepted under these specifications, except that poles containing worm or grub marks below the six-foot mark will be accepted.

Crooked Poles. No poles having a short crook or bend, a crook or bend in two planes or a reverse curve shall be accepted under these specifications. The amount of sweep, measured between the six-foot mark and the top of the pole, that may be present in poles acceptable under these specifications, is shown in the following table:

35-foot poles shall not have a sweep over 10½ inches.
40-foot poles shall not have a sweep over 12 inches.
45-foot poles shall not have a sweep over 9 inches.
50-foot poles shall not have a sweep over 10 inches.
55-foot poles shall not have a sweep over 11 inches.
60-foot poles shall not have a sweep over 12 inches.

Defective Tops. Poles having tops of the required dimensions must have sound tops. Poles having top one inch or more above the requirements in circumference may have one pipe rot not more than one-half inch in diameter. Poles with double tops or double hearts shall be free from rot where the two parts or hearts join.

Defective Butts. No poles containing ring rot (rot in the form of a complete or partial ring) shall be accepted under these specifications.

Poles having hollow hearts may be accepted under the conditions shown in the following table:

Average Diameter of Rot	Add to Butt Requirements of 24 and 30 Foot Poles	Add to Butt Requirements of 35, 40, 45 Foot Poles	Add to Butt Requirements of 50, 55, 60, 65 Foot Poles
2 inches	Nothing	Nothing	Nothing
3 inches	1 inch	Nothing	Nothing
4 inches	2 inches	Nothing	Nothing
5 inches	3 inches	1 inch	Nothing
6 inches	4 inches	2 inches	1 inch
7 inches	Reject	4 inches	2 inches
8 inches	Reject	6 inches	3 inches
9 inches	Reject	Reject	4 inches
10 inches	Reject	Reject	5 inches
11 inches	Reject	Reject	7 inches
12 inches	Reject	Reject	9 inches
13 inches	Reject	Reject	Reject

Scattered rot, unless it is near the outside of the pole, may be estimated as being the same as heart rot of equal area.

"Wind Shakes." Poles with cup shakes (checks in the form of rings) which also have heart or star checks may be considered as equal to poles having hollow hearts of the average diameter of the cup shakes.

Inspection. All poles shall be subject to inspection by the purchaser's representative, either in the woods where the trees are felled, or at any point of shipment, or destination. Each pole thus inspected shall be marked according to its length and class with a marking hammer, by the purchaser's representative. All poles failing to meet these specifications shall be rejected.

SPECIFICATIONS FOR WESTERN WHITE CEDAR, RED CEDAR, WESTERN CEDAR, IDAHO CEDAR—AMERICAN TELEPHONE & TELEGRAPH COMPANY SPECIFICATION

GENERAL.

The material desired under these specifications consists of poles and guy stubs of the best quality of either seasoned or live green cedar of the dimensions hereinafter specified. The poles covered by these specifications are of western white cedar, otherwise known as red cedar, western cedar, or Idaho cedar. Seasoned poles shall have preference over green poles provided they have not been held for seasoning long enough to have developed any of the timber defects hereinafter referred to. All poles shall be reasonably straight, well proportioned from butt to top, shall have both ends squared, sound tops, the bark peeled, and all knots and limbs closely trimmed.

DIMENSIONS.

The dimensions of the poles shall be in accordance with the following table, the "top" measurement being the circumference

MINIMUM DIMENSIONS OF POLES IN INCHES.

Length of Poles (Feet)	Class "A" (Minimum Top Circumference 28) Circumference 6 Feet from Butt	Class "B" (Minimum Top Circumference 25) Circumference 6 Feet from Butt	Class "C" (Minimum Top Circumference 22) Circumference 6 Feet from Butt
20	30	28	26
22	32	30	27
25	34	31	28
30	37	34	30
35	40	36	32
40	43	38	34
45	45	40	36
50	47	42	38
55	49	44	40
60	52	46	41
65	54	48	43

at the top of the pole and the "butt" measurement the circumference six feet from the butt. The dimensions given are the minimum allowable circumferences at the point specified for measurement and are not intended to preclude the acceptance of poles of larger dimensions.

When the dimension at the butt is not given, the poles shall be reasonably well proportioned throughout their entire length. No pole shall be over six inches longer or three inches shorter than the length for which it is accepted. If any pole is more than six inches longer than is required it shall be cut back.

QUALITY OF TIMBER.

Dead Poles—No dead poles and no poles having dead streaks covering more than one-quarter of their surface shall be accepted under these specifications. Poles having dead streaks covering less than one -quarter of their surface shall have a circumference greater than otherwise required. The increase in the circumference shall be sufficient to afford a cross sectional area of sound wood equivalent to that of sound poles of the same class.

Twisted, Checked or Cracked Poles. No poles having more than one complete twist for every twenty feet in length, no cracked poles, and no poles containing large season checks, shall be accepted under these specifications.

Crooked Poles. No poles having a short crook or bend, a crook or bend in two planes, or a reverse crook or bend, shall be accepted under these specifications. The amount of sweep measured between the six-foot mark and the top of the pole, shall not exceed one inch to very six feet in length.

"Cat Faces." No poles having "cat faces," unles sthey are small and perfectly sound, and the poles have an increased diameter at the "cat face" and no poles having "cat faces" near the six-foot mark or within ten feet of their tops shall be accepted under these specifications.

Shaved poles. No shaved poles shall be accepted under these specifications.

Wind Shakes. No poles shall have cup shakes (checks in the form of rings) containing heart or star shakes which enclose more than ten per cent of the area of the butt.

Butt Rot. No poles shall have butt rot covering in excess of ten per cent of the total area of the butt. The butt rot, if present, must be located close to the center in order that the pole may be accepted.

Knots. Large knots, if sound and trimmed close, shall not be considered a defect. No poles shall contain hollow or rotten knots.

Miscellaneous Defects. No poles containing sap rot, woodpecker holes or plugged holes, and no poles showing evidences of having been eaten by worms, ants, or grubs shall be accepted under these specifications.

SPECIFICATIONS FOR SAWED RED WOOD POLES—AMERICAN TELEPHONE & TELEGRAPH COMPANY SPECIFICATIONS

General. The material desired under these specifications consists of poles of redwood (*Sequois Sempervirens*) sawed to shape as hereinafter set forth.

Quality of Timber and Workmanship. All poles shall be of sound No. 1 common redwood; they should be reasonably straight and well sawn.

Dimensions. The dimensions of the poles shall be in accordance with the following table:

Length	"A"		"B"	
in Feet	Top	Butt	Top	Butt
24	6″ x 6″	6″ x 6″	4″ x 6″	4″ x 6″
25	7″ x 7″	10″ x 10″	6″ x 6″	9″ x 9″
30	7″ x 7″	11″ x 11″	6″ x 6″	10″ x 10″
35	7″ x 7″	12″ x 12″	6″ x 6″	11″ x 11″
40	7″ x 7″	13″ x 13″	6″ x 6″	12″ x 12″
45	7″ x 7″	14″ x 14″	6″ x 6″	13″ x 13″
50	7″ x 7″	15½″ x 15½″	6″ x 6″	14″ x 14″

The sectional dimensions of the sawn poles shall not be more than one-quarter of an inch under, or three-quarters of an inch over, the dimensions specified in the above table. No pole shall be more than three inches longer or shorter than the lengths required in the above table.

Sapwood. No pole shall have sapwood covering more than four per cent of the area of all the surfaces. No pole shall have sapwood for a distance of more than eight feet from the top. No sapwood shall be deeper than one inch at any point.

Plugged Holes. No poles shall have plugged holes.

Cracked Poles. No poles shall contain cracks transverse to the length o the pole.

Checked Poles. No pole shall contain large season checks.

Wind Shakes. No pole shall contain wind shakes including in excess of ten per cent of the area of the butt.

Knots. No poles shall contain loose, hollow, or rotten knots, black or red knots shall be carefully examined for internal rot.

In four-inch by six-inch poles sound knots with a diameter smaller than one inch may be present in any number. No four-inch by six-inch pole shall be accepted which contains more than one sound knot in each five superficial feet having a diameter of one inch or more, or which contains any knots with a diameter greater than one and one-half inch.

In all other sizes of poles covered by these specifications sound knots with a diameter smaller than one and one-half inches may be present in any number. No pole shall be accepted which contains more than one sound knot in each five superficial feet having a diameter of one and one-half inches or more, or which contains any knots of a diameter greater than two and one-half inches. (Note:—Where diameters are specified in connection with knots, the knot shall be rated on the basis of its average diameter.)

SPECIFICATIONS FOR YELLOW PINE POLES—NATIONAL ELECTRIC LIGHT ASSOCIATION SPECIFICATIONS

Quality of Timber. All poles shall be cut from the best quality of live, straight grained, unbled, long leaf yellow pine. The butt end shall be squared and the top end pointed to an angle of forty-five degrees. The poles shall be sawed octagonal in shape and shall be dressed, with the heart running parallel to the line of the pole. The timber shall be free of decayed or loose knots or clusters of small knots.

Classification and Dimensions. Poles shall be classified according to their butt dimensions into two classes, to be known as Class "A" poles and Class "B" poles with dimensions for the respective classes as specified in the following table. Where "top" measurement is specified it shall be the diameter at the top of the pole and where "butt" measurement is specified it shall be at the diameter of the butt end of the pole.

Inspection and Rejection. All poles shall be subject to inspection by the purchaser's representative, either in the woods where the trees are felled, or at any point of shipment, or destination. Each pole thus inspected shall be marked according to its length and class with a marking hammer, by the purchaser's representative. All poles failing to meet these specifications shall be rejected.

DIMENSIONS OF POLES IN INCHES (DIAMETER)

Length of Poles	Class "A"		Class "B"	
(Feet)	Top	Butt End	Top	Butt End
30	8	11	7	10
35	8	12	7	11
40	8	13	7	12
45	8	14	7	12
50	8	15	7	13
55	8	15	7	14
60	8	16		
65	8	17		
	8	18		

SPECIFICATIONS FOR CREOSOTED YELLOW PINE POLES—AMERICAN TELEPHONE & TELEGRAPH COMPANY SPECIFICATIONS.

These specifications are for Class "A," "B" and "C" poles of southern yellow pine treated with dead oil of coal tar.

Quality of Poles. All poles shall be sound southern yellow pine (longleaf, shortleaf or loblolly yellow pine) squared at the butt, seasoned, straight, well proportioned from butt to top, peeled and afterwards trimmed close. All poles shall be free from large or decayed knots. All poles shall be cut from live timber.

It is desired that all poles be well air seasoned before treatment and such poles shall be treated in accordance with the requirements for treating seasoned timber contained in the "Specifications for Creosoting Timber." The poles shall not be held for seasoning, however, up to the point where local experience shows that sapwood decay would begin. Unseasoned poles shall be treated in accordance with the requirements for treating unseasoned timber contained in the above mentioned specifications.

All poles shall be sufficiently free from adhering "inner bark" before treatment to permit the penetration of the oil. If the "inner bark" is not satisfactorily removed when the pole is peeled, the pole shall either be shaved, or be allowed to season until the "inner bark" cracks and tends to peel off of the surface of the pole.

Dimensions. The Dimensions of the poles shall not be less than those given in the following table:

No Class "A" poles having a top circumference of less than twenty-two (22) inches will be accepted.

No Class "B" poles having a top circumference of less than twenty (20) inches will be accepted.

No Class "C" poles having a top circumference of less than eighteen (18) inches will be accepted.

Framing of Poles. Before the poles are subjected to the creosoting process they shall be framed, as ordered.

The tops of all poles shall be roofed at an angle of ninety degrees.

DIMENSIONS OF POLES IN INCHES (CIRCUMFERENCE)

Length of Poles (Feet)	Class "A" 6 ft. from butt	Class "B" 6 ft. from butt	Class "C" 6 ft. from butt
25	33	30	28½
30	35	32	30½
35	38	34	32
40	40	36	34
45	42½	38	36
50	44½	40	38
55	47	42½	40
60	49	44½	42
65	51	47	44
70	53	49	46
75	55	51	
80	57		

All Class "A" poles shall have eight gains, all Class "B" poles shall have four gains and Class "C" poles shall have two gains.

The gains shall be located on the side of the pole with the greatest curvature, and on the convex side of the curve. The faces of all gains shall be parallel. Each gain shall be four and one-half inches wide and one-half inch deep, spaced twenty-four inches on centers. The center of the top gain shall be twelve inches from the apex of the gable. A 21/32 inch hole shall be bored through the pole at the center of each gain perpendicular to the plane of the gain.

Inspection. The quantity of dead oil of coal tar forced into the poles shall be determined by tank measurements, and by observing the depth of penetration of the oil into the pole. In the case of poles having a growth of sapwood not less than one and one-half inches in thickness, the depth of penetration shall be not less than one and one-half inches. In the case of poles having a growth of sapwood less than one and one-half inches in thickness, the dead oil of coal tar shall penetrate through the sapwood and into the heartwood.

Depth of penetration shall be determined by boring the pole with a one inch auger. The right is reserved to bore for this purpose, two holes at random about the circumference, one hole five feet from the butt and one hole ten feet from the top. After inspection each bore hole shall be first filled with hot dead oil of coal tar, and then with a close fitting creosoted wooden plug.

The rejection of any pole on the score of insufficient penetration shall not preclude its being retreated and again offered for inspection.

Pole Settings or Foundations. Poles shall be set in the ground to depths not less than those shown in the following tabulation:

Length of Poles (Feet)	Depth in Earth (Feet)
20	5.0
22	5.0
25	5.5
30	6.0
35	6.0
40	6.5
45	7.0
50	7.0
55	7.5
60	7.5

Where the poles are set in rock the depth of setting may be decreased depending upon its character, but this depth shall be not less than four feet. By "length of pole" is meant the total length of the pole and not the height of the pole above the ground.

Where located in soft or swampy ground the setting of poles shall be suitably reinforced. This may be done by setting in barrels of broken stone or gravel, or in stone or timber footings, or by any other equally effective method.

Where located in the sides of banks or where subject to washouts, foundations or pole settings shall be given additional depth or protected by cribbing or riprap.

Back fillings for foundations or pole settings shall be carefully tamped or otherwise thoroughly compacted while being placed.

Identification. For the purpose of identification poles shall be plainly marked with the name, initials or trade-mark of the owner of the poles.

GUYING

Location of Anchors. Guy anchors shall, where possible, be located so that the horizontal distance from the ground line of the pole to the guy rod will be not less than the height above ground of the attachment of the guy to the poles, for head guys, and not less than one-third that height, for side guys. Where the anchor for the head guy is located nearer to the pole than this distance, the amount of guying shall be increased to provide equivalent strength.

A different arrangement and number of guys than specified in paragraph on "Guying Required" may be used provided equivalent strength is obtained.

Guying Required. The poles supporting the crossing span shall be head guyed away from the crossing span and side guyed in each direction. The number and size of guys shall be not less than given in the following table:

Number of Wires in Crossing Span	Number and Nominal Tensile Strength of Guys: Minimum Depth	Side Guys (in each direction).
1 to 10 wires	1— 6,000 lb. strand	1— 6,000 lb. strand
11 to 20 wires	1— 6,000 lb. strand	1— 6,000 lb. strand
21 to 30 wires	1—10,000 lb. strand	1— 6,000 lb. strand
31 to 40 wires	2— 6,000 lb. strands	1— 6,000 lb. strand
41 to 50 wires	1—16,000 lb. strand	1—10,000 lb. strand
51 to 60 wires	2—10,000 lb. strands	1—10,000 lb. strand
61 to 70 wires	1—16,000 lb. strand	1—16,000 lb. strand
71 to 80 wires	2—16,000 lb. strands	2—10,000 lb. strands

Location of Guy Attachments to Poles. On poles carrying one or two crossarms both head and side guys shall be attached under the upper crossarms. On poles carrying more than two crossarms the first head guy shall be attached below the second crossarm and successive head guys under the fourth and sixth crossarms. On poles carrying more than two crossarms side guys shall be attached below the second crossarm.

Alternative Method of Guying. Where on account of physical conditions it is impracticable to guy the crossing poles as specified, the requirements of this paragraph may be met by head guying and side guying the line as near as practicable to the crossing, but at a distance not exceeding 500 feet from the nearest crossing pole, provided; that a strand of strength equivalent to the head guy is run between the two guyed poles, being attached to the guyed poles at the point at which the head guys are attached, this strand being securely attached to every pole between the guyed poles.

Where the poles supporting the crossing span are not in line with the poles in the adjoining spans, additional guying shall be placed to take care of the increased strain.

Pole Braces. Braces may be used instead of guys to obtain the reinforcement above specified.

Material for Guys. Guys shall be of galvanized or copper covered stranded steel cable or rolled rods and must have a minimum nominal diameter of five-sixteenths inch.

Anchorage. Guys to ground shall be connected to an anchor rod of such length that the eye of the rod shall be above the surface of the ground. Rods with a diameter of less than one inch shall be galvanized.

Guy Stubs. Guy stubs or poles may be used in place of anchors provided the same amount of reinforcement is obtained by their use.

Anchor Logs. Anchor logs for use with different sizes of guy strand shall be of the dimensions and shall be set to the depths given in the following table:

Nominal Tensile Strength of Guy Strand	Minimum Depth of Excavation	Minimum Length and Width of Round Logs	Minimum Length and Width of Split Logs.
6,000 lb.	4 ft.	3 ft. x 6 in.	3 ft. x 8 in.
10,000 lb.	5 ft.	4 ft. x 7 in.	4 ft. x 10 in.
16,000 lb.	5 ft.	6 ft. x 8 in.	6 ft. x 12 in.

The above sizes of logs and depths of setting apply to soil of average compactness. In loose sandy soil the depth of setting or the length of the logs shall be adequately increased.

CROSSARMS

Crossarms. Wooden crossarms carrying the crossing span shall be of long-leaf yellow pine, fir or other suitable timber and shall have a minimum section of three inches by four and one-quarter inches. Galvanized or painted iron, or steel crossarms, of equal strength may be used.

Crossarms shall be double on the crossing poles and shall be held together with properly fitted spacing blocks or bolts placed immediately adjoining the outside pins. Both crossarms shall be properly fitted in gains and held in place by not less than one five-eighths inch through bolt. Both arms shall be fitted with galvanized iron or steel braces not less than three-sixteenths inch by one and three-sixteenths inches by twenty-six inches long which shall be attached to the crossarms by a lag screw not less than two and one-quarter inches by three-eighths inch or a carriage bolt not less than four inches by three-eighths inch and to the pole by a fetter drive screw or lag screw not less than four inches by one-half inch or by not less than a one-half inch through bolt.

PINS

Pins. Insulator pins shall be of steel, wrought-iron, malleable iron, or locust wood. Locust pins shall be sound, straight-

grain locust, with a minimum diameter of shank of one and one-quarter inches and a maximum length of eight inches. Steel or iron pins shall have a minimum diameter of shank of one-half inch and a maximum length of eight and three-quarter inches.

INSULATORS

Insulators. Each insulator shall be of such pattern, design and material that when mounted it will withstand without injury or without being pulled off the pin, the ultimate strength of the conductor attached to the insulator.

CONDUCTORS

Material of Conductors. Conductors shall be of copper, copper covered steel, galvanized steel, or other corrosive resisting metal, provided, however, that galvanized steel shall not be used in localities subject to excessive coal gases or other conditions which would cause excessive corrosion.

Size of Conductors. The minimum allowable sizes for conductors of the crossing span and adjoining spans are as follows:

COPPER

Spans 125 ft. or less — No. 10 A. W. Gauge
" 126 ft. to 150 ft. — No. 9 " "

GALVANIZED STEEL

Spans 125 ft. or less — No. 10 B. W. Gauge
" 126 ft. to 150 ft. — No. 8 " "

If spans in excess of 150 feet are necessary, the size of conductor specified above shall be increased.

Conductors of material other than copper shall be of such size and so erected as to have a mechanical strength not less than that of the sizes of copper conductors given above.

The use of twisted pair wires without a messenger wire support shall be eliminated as far as practicable. In no case shall this kind of wire be used in spans longer than one hundred feet without a messenger wire support. Each wire of a twisted pair not supported by a messenger wire shall be tinned hard drawn copper not smaller than No. 14 A. W. Gauge or tinned copper covered steel not smaller than No. 17 A. W. Gauge.

Sag of Conductors. Conductors of the crossing span shall be strung with sags not less than shown in the tables given:

MINIMUM SAGS FOR HARD AND SOFT DRAWN COPPER WIRE

No. 10 A. W. G. HARD DRAWN BARE COPPER WIRE

Temperature.

Length of Span in Feet.	0° F.	20° F.	40° F.	60° F.	80° F.	100° F.
80	1½	2	2½	3	3½	5
90	2	2½	3	3½	4½	6
100	2½	3	3½	4½	5½	7
110	3	3½	4½	5½	6½	8½
120	5	6	7	9	11½	14½
130	8½	10½	13	16½	19½	23
140	15½	19	22½	25½	29	32
150	25½	29	32½	35½	38	41

No. 6 A. W. G. SOFT DRAWN COVERED COPPER WIRE.

Temperature.

Length of Span in Feet.	0° F.	20° F.	40° F.	60° F.	80° F.	100° F.
60	3	4	5	6	8	9
70	5	6	7	9	11	12
80	6	7	10	12	14	15
90	8½	10	13	15	17	19
100	12	14	16	19	21	23
110	16	18	21	23	25	27
120	19½	22	25	27	30	32
130	25½	27	30	32	35	37
140	30½	33½	36	38½	41	43
150	39½	42	44½	46½	49	51

Splices in Conductors. The conductors in the crossing span shall be free from splices or taps.

Conductor Attachments. Each conductor shall be attached to its insulators by tie wires. Copper and steel wires shall be tied to the insulators in the manner shown in the drawings. Tie wires for copper or copper covered steel wires shall be of the same gauge as the line wire and of soft copper or of hard drawn copper which has been thoroughly annealed. Tie wires for steel line wire shall be of soft iron or steel and of the same gauge as the line wire up to and including No. 9 B. W. Gauge. Tie wires for No. 8 B. W. Gauge steel line wire or larger shall not be smalled than No. 9 B. W. Gauge.

CABLES

Strand for Supporting Cables. Galvanized steel strand cable having a breaking strength of not less than 6,000 pounds shall be used to support cable of fifty pairs of No. 19 A. W. Gauge copper conductors or their equivalent and smaller; or not less than 10,000 pounds breaking strength for cables in excess thereof up to 100 pairs of No. 19 A. W. Gauge copper conductors or their equivalent; and not less than 16,000 pounds breaking strength for cables containing more than 100 pairs No. 19 A. W. Gauge copper conductors or their equivalent. Not more than two messenger wires for supporting cable shall be attached to either pole of the crossing span.

Sag of Strand Supporting Cables. Cables shall be suspended with a minimum sag as follows:

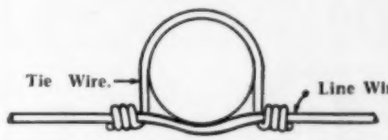
Span in Feet	*Minimum Sag in Inches*
80 or less	16
90	20
100	22
110	26
120	30
130	34
140	40
150	44
175	62

Attaching Cables to Messengers. Cables shall be attached to messenger wire supports by means of galvanized metal rings or hangers, or marline, or marline hangers. The method of attachment shall be such as to develop the full strength of the messenger wire.

GALVANIZED MATERIAL

Galvanizing. Galvanized material shall meet the requirements specified by the National Electric Light Association or other standards generally sanctioned by good modern practices.

Tie for Copper Wire



Tie for Iron Wire

Sherardizing of small parts is permitted.

All holes in galvanized material shall be made before galvanizing.

OTHER CONSTRUCTION REQUIREMENTS

Auxiliary construction, such as guy attachments to poles, guy clamps, anchorages, etc., not definitely covered by these specifications, shall be of such design and strength as to develop the full strength of that member of which they are a part.

Construction requirements not covered by these specifications shall be according to the best modern practice.

Construction of Overhead Lines Crossing Railroads by Means of

UNDERGROUND CONSTRUCTION

Scope. These specifications apply to the crossings of all classes of wire lines crossing railroad tracks underground.

Conduit. Wires or cables shall be carried in some suitable form of vitrified earthenware, treated fiber, creosoted wood duct or iron pipe conduit, of a size sufficient to permit the wires or cables to be readily drawn in, and shall terminate in manholes, pull boxes or terminals. Wherever practicable, such manholes, pull boxes or terminals shall not be placed on the railroad right of way.

Depth. The top of the conduit shall be located at a depth of not less than four feet below the base of the rail, nor less than

two feet, six inches below the surface of the ground at the lowest point of crossing of the railroad right of way. Wherever practicable, conduit shall be laid with a uniform slope of not less than three inches per 100 feet, to drain away from the crossing.

Terminals. Where manholes, pull boxes or terminals project above the elevation of the top of the rail, unless physical conditions or municipal requirements prevent, they shall have horizontal clearance from the nearest track rail of not less than twelve feet, except that at sidings a clearance of seven feet may be allowed. At loading sidings, sufficient space shall be left for a drive-way.

Protection. Conduit, excepting iron pipe, located at a depth of less than six feet below the top of the rail, shall be protected on top by a slab of concrete not less than six inches in thickness, or by creosoted wooden planks not less than two inches in total thickness; this protection shall extend not less than three inches on each side beyond the outer lines of the conduit. Note—In using creosoted planks to meet this requirement, more than one plank may be used.

For cause shown, in special cases, the commission may afford relief from the operation of these regulations to any particular public utility when public convenience and safety will not be injuriously affected thereby, and the welfare of such public utility will be subserved by modifications of any of the foregoing regulations and specification.

Grand Forks Urges Physical Connection

Members of the Grand Forks, N. D., physical connection committee recently returned from a tour of inspection in cities where the connection of telephone lines has been adopted and armed with recommendations from several municipalities, they are prepared to tell of the benefits to be derived by the joint service.

The mayor, J. A. Dinnie, City Attorney George A. Bangs, and the city auditor, W. H. Alexander, composed the party who have been making an extended trip through Minnesota and Wisconsin in search of information which will aid them in the solving of their problem in the city of Grand Forks. The Tri-State Telephone Company of Minneapolis and the Northwestern Telephone Company, a branch of the Bell Telephone Company, are the competing lines in that city.

At the present time it is impossible to make a connection between the two lines and it is the earnest desire of the representatives of the city to secure the best possible plan for the benefit of the citizens. The plan of paying five cents for the transfer of the call seemed to meet with the approval of the North Dakota men, but the graduated scale of payment on long distance calls is not in harmony with the plan which they have under consideration.

On their trip the three men have had conferences with members of both the Wisconsin and the Minnesota railroads commissions, in addition to inspecting the systems in use in several cities. La Crosse and Janesville, Wisconsin, and Owatonna, Minnesota, have dual service and the connection plan in vogue in those places was carefully discussed.

In some of the cities visited telephone companies objected to the physical connection of lines and before the system could be adopted litigation was necessary. City officials have obtained copies of briefs and arguments that were presented by telephone companies and municipalities to railroad commissioners and supreme courts in the legal battles to obtain the connections.

Patrons of telephone companies and municipal officials strongly endorse the system, members of the committee say. In the cities visited telephone companies are compensated by toll charges for the use of their lines by patrons of competitive concerns. Five cents for local calls is claimed to be the charge made.

Following the reading of the telephone committee's report before the city council, the committee sent a letter signed by Chairman Whitman, to both of the telephone companies in the city, inviting them to send representatives to a conference as soon after November 1 as possible, for the purpose of discussing the physical connection of the lines of the Northwestern and the Tri-State telephone companies.

The letter, signed by Chairman W. S. Whitman, reads as follows:

"The report of the special telephone committee was submitted to the city council last evening, October 18, 1917, and the recommendations therein contained were adopted, which recommendations in substance were that the committee confer with both companies for the purpose, if possible, of obtaining physical connection of the two telephone exchanges for both local and toll business amicably and without litigation. Such agreement, if possible, to cover the question of compensation, if any to be allowed, therefor.

"In the event of a failure to so agree the recommendations contemplate such further proceedings as may be deemed advisable.

"Will you kindly advise me at your earliest convenience whether or not you will join the committee in the conference which is suggested and do you think that representatives of both exchanges should be present at the conference at the same time and if you should feel like joining in such conference will you kindly indicate a time and place therefore as soon after November 1 as convenient."

In the Malay States

Consul General Edwin N. Gunsaulus, Singapore, Straits Settlements, says that according to official returns there were on December 31, 1916, 2,210 miles of telegraph and telephone line and 10,461 miles of overhead wire in the Federated Malay States, of which 7,914 miles were telephone wires. There were, in addition, 26½ miles of underground telephone cables, containing 2,418 miles of wire, single line. These figures include 1,007 miles of telephone wire maintained by the railway department for its own use. The Posts and Telegraphs Department also owns 242 miles of telegraph wire in the State of Johore.

The revenue derived from telegraphs was $102,031, the figures showing an increase of $27,244 as compared with 1915. The revenue derived from telephones in the Federated Malay States for 1916 was $109,457, being an increase of $8,792 over 1915.

Eight Ways to Save Gasoline

Automobile clubs are getting after the "gasoline slacker," and the following eight rules have been prepared for the guidance of motorists who wish to be economical, by Mancius S. Hutton, laboratory engineer of the Automobile Club of America:

1. Do not allow the engine to run idle, except when absolutely necessary.
2. Run the car on a lean mixture.
3. Prevent leaks in the gasoline line, and shut off gasoline at the tank whenever possible.
4. Keep the motor free of carbon. A carbonized motor is a large consumer of fuel.
5. Change gears more frequently in order to run the engine at high, economical, and efficient speed.
6. Keep the moving parts well lubricated.
7. Keep tires properly inflated.
8. Use kerosene for cleaning instead of gasoline.

Obsolescence as Affecting Rates

A Discussion Brought Out in a Rate-Case on Trial Before the Master in Chancery at San Francisco

BY C. E. GRUNSKY

An appliance, machinery or a process of manufacture in use by a public utility may under efficient management at any time be superseded by a better device or process. When this is the case more or less property is usually discarded, which, under the conditions as they prevailed when this property first came into use, should have served for many years longer. Obsolescence has forced its abandonment.

The knowledge that obsolescence may shorten the term of usefulness of a machine or of portions of any plant used in the public service has prompted valuation experts and the rate regulating authorities to attempt estimates of the allowances which should be made in the earnings to cover the prospective abandonment of property due to this cause.

The last word has not been said in the discovery of new forces in nature and their adaptation to human requirements. It is the belief of many engineers, for example, that the internal combustion engine will put the old types of marine engines of ocean freighters on the scrap heap, and yet the older type under gradual development to its present high state of efficiency has maintained itself for more than a hundred years.

The use of oil in place of coal, not alone as a producer of gas but also as fuel in the production of steam, has caused appliances and machinery to be abandoned which would otherwise have continued in service. No one today can be sure which of two extremes is most likely to prove true, whether, for example, the last word has been said in the manufacture of gas and there will be no further abandonment of standard gas making appliances and processes, or whether, due to exhaustion of sources of oil, or due to other causes, there may not be some new substitute for oil or for the gas itself found which will render some of the most modern appliances of the day obsolete in the near future.

Past experiences in the matter of abandonment of property, due to obsolescence, is not a dependable guide to what may happen in the future. In this respect there is a difference between the failures from this cause and those which result from the wear and tear of use and from the somewhat less regular failures through accidents incident to human frailty, fire and similar causes. In the one case the basis for a satisfactory prediction is lacking. In the other the probability of events occurring in the future can be predicated with some confidence upon what has occurred in the past. There is a difference, too, between replacements made as the result of obsolescence and replacements due to failure from other causes. In the case of obsolescence the replacement is made with some device which betters the service—the output costs less, or the service is made more reliable or the quality of the output is improved, while in the case of ordinary replacements or renewals the betterment of service is not a necessary incident.

It is proper to charge the rate-payer with the cost of replacement when property fails from ordinary causes and to let the earnings, therefore, cover a replacement increment during the useful life of any item of property and to base the charge on the ordinary replacement requirement as determined for such property. Not so, however, in the case of obsolescence. This will be made plain by the following considerations.

There would be no obsolescence if the improved machinery or the new process which takes the place of that which is being replaced did not result in some advantage to some one. If the obsolete property were treated as though its failure had been correctly foreseen and as though funds for its replacement had already been collected from the rate-payers and if the owner had not in fact collected sufficient sums, and if thereupon the remaining value of the obsolete property or the capital investment at which it was carried in the rate-base were immediately ignored, and rates were established as though the abandoned proper had never been in use, the rate-payer would at once get the full benefit of the innovation and the owner would have made a sacrifice of capital which he could perhaps have avoided by being a less efficient manager and holding to the older, less efficient plan of operation. Let it be known that the usual procedure will be to forecast failures by obsolescence and to amortize the capital in such properties on the basis of assumed average conditions which means inadequate amortization in many cases, and there will no longer be any inducement to the owner to improve the efficiency of his plant. He will conclude that it will be safest not to use new inventions or to introduce new processes so long as a sacrifice of capital is thereby involved. He might, in making an innovation, find that he had on his hands abandoned property, the cost of which has not only not been fully returned to him but concerning the further amortization of which the established rules of rate regulating bodies may give no adequate assurance.

It seems self-evident that when the introduction of a new invention, whether the same applies to a machine or to a process, reduces the cost of operation, the resulting advantage should go to both the owner of the utility and the rate-payer. But it is also true that in such event there will be no hardship imposed on the rate-payer if the benefit of reduced cost of producing the output, does not come to him immediately. A reasonable procedure would therefore be, in all such cases, to allow the rates to remain as they would have been without the new process, unless a reduction would result in increased demand and greater net profit to the owner, at least long enough to amortize so much of the original plant as is thereby rendered useless and, thereafter, to so adjust rates that, for a suitable period of time, the benefit of the reduced cost will be shared on a fair basis by the owner and the rate-payer. Any treatment less favorable to the owner of a public utility would discourage the introduction of innovations if they involve further investment of capital and would make for inefficient rather than for efficient management. The owner must not be expected to consent to an increase of hazard without an increase of profit.

The practice of attempting to foresee obsolescence and of burdening the rate-payer before the failure by obsolescence with the charge that is necessary to amortize the capital which obsolescence renders useless, is not alone unwise but unjust. It is not fair to the rate-payer because those who pay rates before the betterment is

made should not be made to pay for the advantage which will come to those who pay rates after the betterment has been made; it is not fair to the owner because while apparently increasing his earnings it will act, as do all high charges for service, as a deterrent upon the extension of business and because there will be cases where by error in the estimate of time allowance for obsolescence the owner will be called upon to make a sacrifice when due to obsolescence property is abandoned, which can not be offset against the advantage that may come to the owners of other utilities who benefit by an allowance for something which, in their case, never happens. The obsolescence will, in many cases, occur before any adequate provision has, in fact, been made.

To illustrate the problem which is presented when one type of machinery is replaced by a better type, let it be assumed that the machinery of an old style generating station has been replaced by steam turbo generators, that the old machinery had been in use for some years, that it was still in first class condition but that its abandonment was advisable because, all factors being taken into account, the generation of electric energy will be cheaper with the new installation.

Suppose that the remaining or present value of the abandoned machinery, as a part of the utility, was $200,000 (original cost $250,000 less $50,000 earned replacement), and that $75,000 was realized from its sale after abandonment. Suppose further that an appraisal of the new machinery after its installation shows that it should be introduced into the rate-base at $150,000.

Two cases are possible, either the $50,000 of earned replacement increments have actually been returned to the owner and have reduced the remaining investment from the original $250,000 to $200,000, or the $50,000 are carried in a replacement fund. In the first case on the assumption that only property in use is carried in the rate-base, there would be, after the new machinery is installed, a value to be taken into account reduced by the $200,000 and increased by the cost of the new machinery, that is, $150,000 less the sale value of the old, or $150,000—$75,000 = $75,000. The result would be a net reduction of present value, as appearing in the rate-base, of $125,000. This amount, on some theory other than "present value," could be retained in the rate-base subject to amortization, or it could be transferred to profit and loss or some other account where it would be carried until together with interest thereon it is completely wiped out. In the second case the old machinery would have been carried in the rate-base, at the time of its obsolescence, at $250,000, the original cost, undiminished by accrued depreciation, but this amount would have been offset in part by the $50,000 in the replacement fund. By the transfer of this sum the $250,000 would be reduced to $200,000 and there would then be an addition of the net cost of the new machinery, or $75,000. The rate-base would include on account of both old and new machinery an amount of $275,000, which is $125,000 in excess of what should be in it if original investment in property in use is the determining factor. In either event there will be $125,000 to be either carried indefinitely in the rate-base or to be amortized within a reasonable time.

Unless the owner felt reasonably certain that the $125,000 would be returned to him in some way, he would not prematurely discard the old machinery. If as a result of the change rates are reduced to a point excluding interest on and amortization of the $125,000 the owner will have made a sacrifice for the benefit of the rate-payer out of all reason. If, however, the rates remain undisturbed for a time, then, during this time the excess of earnings, over operating expenses, will be larger than it had been under the original plan of operation by the amount that the cost of operation has been cut down. This increase of net earnings, perhaps cut down somewhat by voluntary action of the owner, should be used to amortize the $125,000 and interest thereon, and when this is accomplished a reduction in rates would naturally ensue, and the rate-payer would share in the benefit resulting from the reduced cost of operation.

New Radio for Base Hospital

Demonstration of a wireless telephone invented by Earl C. Hansen, a Los Angeles young man, was one of the features of a recent entertainment at the Ebell Club in Los Angeles, Cal.

Particular interest was attached to the trial because it was not only the first time the apparatus has been used in public, but because it will be a part of the equipment of the base hospital to be operated on the French front, under the direction of Dr. Ray Smith. The wireless telephone will be the gift of the Ebell Club.

In demonstration of the invention the sending apparatus was located in one of the upper apartments of the club, from which point the sound waves were sent into practically every room of the building. A talking machine was used in furnishing the music.

In the main audience room of the club the music emanated from a large cabinet, although the demonstration also included the use of individual receivers.

With the use of the invention it was announced during the demonstration it is possible to furnish music to the individual patient in a hospital while the sufferer in a cot near by will hear no sound. Nurses also will be able to read newspapers and stories with the use of the apparatus to several hundred patients at the same time.

Final Stage of Los Angeles Merger

The final stage in the merger of the two telephone systems in Los Angeles was reached October 4 when the commissioner of corporations authorized the distribution of the Home Company's capital assets to the Home stockholders. The matter of the distribution will be submitted to the stockholders and the ratification by them will be in the nature of a mere formality.

Commissioner Carnahan's decision was in conformity with a recent amendment to the civil code of the state which places the distribution of assets under the authority of the Corporation Department.

The decision empowered the directors of the Home Company to distribute to both the preferred and the common stock $75 per share in par value of the bonds of the Southern California Telephone, the corporation which represents the merger of the former Home and Pacific companies of Los Angeles.

The decision further provided for a disbursement of a dividend of $30 a share out of the Home's past earnings on the preferred stock. This amount makes up for the years when no dividends or dividends less than the guaranteed rate of 5 per cent were paid on the preferred.

The issue of the bonds of the Southern California Telephone Company to the holders of the preferred and common stock calls for the surrender of such stock to G. B. Ocheltree, assistant treasurer of the Home Company, who, in the capacity of trustee, will hold them, pending an order from Commissioner Carnahan relative to their final disposition.

European Telephone Practice

Translations from the Foreign Press and Communications from European Engineers

BY FRED W. SCHOLZ

ESTIMATING TELEPHONE EXCHANGE EQUIPMENT — (*concluded*).—*Multiple Switchboards:*—As was said before, one- or three-section switchboards should be used, depending on whether the number of connections entering the exchange remains below 3,000 or passes this limit. Within each system of switchboards a sharp distinction should be maintained between A- and B-switchboards; the A-switchboards have the subscribers' wires with the call signals and the subscribers are here connected with their own exchange and asked for their number; at the B-switchboards the inter-office trunk (*IT*) traffic coming from other exchanges is taken care of by the operators. B-switchboards are therefore used only in those exchanges having interoffice traffic. In exchanges in which the *IT*-traffic amounts to 70 per cent or more of the total traffic to the exchange, the switchboard equipment, is divided as follows: the A-switchboards contain in the main the answering panels and jacks for outgoing lines, while the subscribers' multiple panels appear only at the switchboards devoted to the incoming *IT*-traffic (B-switchboards). For the different cases the following equipment is needed:

For exchanges up to 3,000 lines, one-section switchboard with 3 panels are sufficient. These must hold about 300 call signals, 300 outgoing trunks and 3,000 subscribers' lines, the multiple field for trunk and subscribers' lines being distributed over two switchboards with six panels. The switchboards are used as A- and B-boards, even with the distribution as described.

For exchanges with more than 3,000 subscribers' lines 3-section switchboards with 9 panels are needed: (*a*) For undivided equipment: A-switchboards with an answering field holding 300 call signals at each operator's place, able to hold 600 outgoing lines, all the six panels repeated, and capacity for 10,800 subscribers' lines distributed over 9 panels. B-switchboards with a subscribers' multiple field for 10,200 lines, arranged in 6 panels and provided with 120 outgoing trunks. (*b*) With divided equipment we have: A-switchboards with an answering field for 360 call signals at each operator's position and able to hold 2,100 outgoing lines distributed over six panels.

Number and Equipment of A-switchboards:—From the number of measured rate and flat rate subscribers, as well as from the pay stations and the traffic during the heaviest traffic hour, the number of A-positions is figured which is needed to answer all calls coming into the exchange. If, for example, the investigations have shown that after 15 years there will probably be 5,600 measured rate (*MR*-service) subscribers, and that for each subscriber the exchange must figure on 21.6 calls during business hours and that 1/9 of this number or 2.4 calls fall within the heaviest traffic hours, then the traffic to be answered within that advance period will amount to 5,600x2.4 or 13,440 calls. To meet this traffic 51 A-operators are needed approximately, assuming that each operator can take care of 264 calls. In the same way the traffic requirements are figured out for the flat rate (*FR*) subscribers and the telephone pay stations. To the total number of A-positions it is wise to add half an end position, as at these only one neighboring operator can help out and therefore only half the capacity is reached.

The equipment of the jack panel is given from the number of lines for each class, divided by the number of operators' places. This value is then added to, until the total can be divided by ten without leaving a remainder. The answering jack panels are then equipped with as many connections as are needed to meet all calls that come in during the heaviest traffic hour (*HT*-hour). In the example quoted before, there were 51 operators for 5,600 subscribers, which gives about 110 call signals for each operator, which number is rounded off to 120. Each operator's place must have as many *MR*-service subscribers' lines as are needed to bring the total calls per *HT*-hour to about 264, this being the capacity limit for each operator.

When arranging the A-switchboard panels it is advisable to have the jacks belonging to *FR*-service subscribers lower down and easier to reach than the *MR*-service subscribers, as these require usually a greater number of trunks for answering their calls than the latter.

The Multiple Field:—The multiple field should be able to hold the number of actual connections plus 5 per cent for changed, disconnected and reserve connections. Where a great many party line connections are found and where each party has his own jack, suitable allowance has to be made. When arranging the numbers in the panels it is wise to place those numbers which belong to subscribers who do not use their telephone very much further up on the field and keep the numbers of fairly busy subscribers further down and nearer to the hand of the operator.

Field for outgoing trunks:—From the statistics on the outgoing interoffice trunk service during the *HT*-hour the number of trunks is found, required to meet this portion of exchange service. This is done by dividing the total number of calls by the number of connections which are made within one trunk during the period of one hour. This number varies, depending on the average time of "busy wires" for each trunk and whether direct connection or A- and B-switchboard service is used. When using order wire service another factor enters, namely the number of wires required to answer a single call. The best utilization of trunks in order wire service is obtained, when an A-operator has three B-operators from whom to choose a connection. For example, assuming an average time of 2 minutes per conversation with order wire and interoffice trunk service, provided an A-operator can pass on her call to any one of three B-operators, we have an efficiency of about 18.5 calls for each trunk. If then, the traffic from one exchange to another is 1,390 calls during the *HT*-hour, then there will be required under the conditions just noted:

$$\frac{1390}{18.5} = 75 \text{ trunks.}$$

Aside from the jacks for the interoffice trunk service several jacks should be left open for special purposes, like wires to information, to the supervisor's table, to the wire chief, as also jacks for the long distance operators.

Usually the outgoing trunks are wired in multiple

and are divided into groups only when the number of wires to the various exchanges is very large.

Operators' Keys:—For each exchange which is connected to another exchange, at least one operator's key should be allowed and possibly two, if the service between the two exchanges is very heavy. In addition a special listening key for use when connecting with the supervisory table must be placed at each operator's position. The wire from the various operators ends at the supervisory table in a jack. If the supervisor plugs her jack then special signal lamps light up at all the operators' positions. The operator then pushes down on her listening key and connects herself to the supervisor and receives the instructions which are in this way given simultaneously to all the operators. To these keys there are usually added a few reserve keys. The keys are usually rounded off into numbers of five, as five connections are on one strip.

Pairs of Cords:—Newer designs of multiple switchboards have as many as 18 pairs of cords but 15 is considered the minimum. The need for cords depends on the length of conversation and the number of calls made at each operator's place. The shorter the length of conversation, the more frequently can the pair of cords be used. If for example each conversation were to take 2 minutes, then each pair of cords could make 30 calls per hour, assuming that rate of use is uninterrupted within that period. If the capacity of the operator in question is 270 calls, then 9 pairs of cords would suffice. In reality more cords are needed, however, as the calls are not distributed evenly over the hour, but come in sudden gusts and impulses. An additional allowance of cords must be made for this. In general we can assume that the *FR*-service subscribers will need more cords than the *MR*-service subscribers. The best way of settling the question is to consult past statistics at each individual exchange.

Number and Equipment of B-switchboards:—From the number of incoming calls during the *HT*-hour and the capacity of calls for each operator within that time, the number and equipment of B-switchboards is estimated. The capacity varies, depending on the question of direct connection or order wire service. In the latter case it also depends whether call current is given automatically or by automanual methods. It also depends on the question, whether the trunk line is used by this exchange alone or is shared by other exchanges and how many trunks are connected into one group system. The number of incoming trunk calls is found similar to the outgoing trunks and will generally be found to agree.

The B-switchboards hold the subscribers' multiple field just the same as the A-switchboards (wires in operation plus 5 per cent for reserve). In addition jacks must be wired, likewise in multiple, for the signals "busy-wire" and "trouble" for wires to information, to the supervisor's table, to the test table, and where connections are transferred to third exchanges, for trunks leading to these exchanges.

The number of cords varies with the average length of conversation. Besides this, the amount of work that has to be done by each operator when connecting calls will be an important factor. Where this work is reduced, as is the case when using automatic call current generating, the efficiency of the operator will be very high. Naturally also, this efficieniy will be high, where the operator is fortunate enough to have subscribers whose calls and time of conversation is evenly distributed over the hour. Where business calls are the order of the day, from 25 to 27 cords are needed, the number usually chosen being 30.

Transfer Switchboards:—Where these are used, the same applies approximately as was said of the B-switchboards. Where a great many long distance calls are received it is advisable to make the number of cords greater, perhaps 40, as long distance calls are frequently of longer duration than the ordinary local call.

Supervisor's Table:—As a rule one supervisor's table is sufficient, and this can be used for both local and long distance service. It contains the following equipment: Control wires, one listening jack for each operator in the exchange; telephone wires, both incoming and outgoing for direct connection with the operators and the other exchanges; observation lines to supervise the activity in the different subscribers' lines; test lines to test and inspect the service of the different operators; operator wires to give simultaneous information to all of the operators in the exchange.

Information Table:—In larger exchanges all the work which does not belong strictly in the field of the operator is carried on by "information." These tables are similar to the supervisor's table and have outgoing and incoming wires for connection with the operators and the other exchanges.

Night Calls:—The operators' supervisory relays have a second contact, to which a second special lamp signal is connected, used for night calls. Usually it is sufficient to unite the second contacts for a group of operators or a row of switchboards. These contacts are then collected at the night switchboard at which the night operator is on duty.

Test Switchboard:—The test board or wire chief's desk is equipped for one or two operators; exchanges of average size find one-position test switchboards sufficient. This board, which is best placed near the main distributing frame, has usually 10 connections to the main distributing frame and a number of test lines (about 0.7 per cent of the number of subscribers), which lead to one or the other end positions at the local board. By means of the test lines troublesome wires are connected to the test board for investigation; by inserting the test plug at the end switchboard the troublesome line is marked by a buzz, which notifies the operator by this buzzing that the line is being tested. For an exchange with 6,000 subscribers about 42 test lines are enough. Where the wires are aerial, this number will have to be increased; on the other hand it can be reduced where most of the wiring is underground.

Operators' Equipment:—As many breast microphones and head receivers must be provided as there are operators at the multiple switchboards plus operators at the long distance switchboards. An additional 80 or 100 per cent should be kept in reserve.

Long Distance Switchboards:—Here also it must be decided first what system to use. In general there are two possibilities: The long distance switchboards can be provided with the local multiple system and can be continuous with the local boards, thus obviating the order or call wire service. When special long distance switchboards are used, they are usually united into one long distance exchange. The former possibility is usually applied in small exchanges with single operator switchboards, where the same switchboards are used for long distance as for local calls and are placed in one row with the local board. The only difference is, that the jack panels are provided with long distance instead of with local lines and that the cords are specially designed for

long distance service. In the local exchange switchboards with several operators' places, the above arrangement cannot be used in general, as too many long distance lines end at these exchanges and a large number of long distance operators is needed. If these were to be equipped throughout with the subscribers' multiple panels, the cost of the multiple fields, including depreciation charges, upkeep, etc., would be too high and would not make long distance calls a paying proposition.

In the following discussion it is therefore assumed that the long distance work is carried on at special switchboards united to form a separate long distance exchange. Switchboards equipped with pairs of cards, with separate main and intermediate distributing frame and relay frame are assumed for the estimate.

The main distributing frame must have sufficient space to carry all the long distance lines, the test lines, and the physical lines used for the phantom system of telephony. The intermediate distributing frame and relay frame must also be figured large enough to take care of all lines connected at the present time plus sufficient reserve for future growth. As regards the switchboards, the multiple field which extends over two operators' places is equipped as follows: The number of long distance trunk wires and a number of long distance subscribers' jacks must agree with the total number of long distance connections. The number of order wires depends on the extent of the order wire service. Further jacks must be allowed for special purposes, as to information, to the supervisor's table, etc. The number of cords for each place depends on the number of lines that are served by each operator and the method of operation. The earlier the subscriber is summoned by the operator over the order wire to answer a call and the longer each pair of long distance cords is used per call, the more pairs of cords are needed. An average number of pairs needed for this kind of work is 4 to 5 pairs. The number of exchange switchboards depends on the number of long distance lines and the amount of work performed by each operator. Consideration must also be taken that service with certain communities, primarily those not very distant, can develop so rapidly that it will be necessary to choose a simpler method of operation; as for example, A—switchboards with interoffice trunk service. Where such a development can be expected, deductions may be made when estimating the long distance equipment. So as to carry on long distance traffic at night as well, one or more of the switchboards must be arranged for night service. Here as many night signal lamps must be built into the switchboard as are needed for the number of lines that are likely to call during the night. Moreover each place should be fitted with at least 10 pairs of cords. For information ordinary switchboards can be used, which in place of the long distance lines have connections to the exchange operators and other exchanges. Supervisory table is either separate or else the same as the local table. The information tables also depend on the frequency with which information is asked for by long distance and the amount of work expected of each operator. Likewise the number of wires needed for this service is found from the service required during *HT*-hour and the average capacity of such a line.—*Fernsp. Tech.*

PROTECTION OF CABLES AGAINST ELECTROLYSIS

In the struggle against electrolysis of telephone cables, preventive measures are by far the most efficient in avoiding trouble. The most rational method is that which so improves the telephone distribution system that its expansion over roads with electric traction or high power cables is avoided. This, however, cannot be done except in a few cases and we must try other means to reach the desired results. In default of a method which can reach and reduce the intensity of the current losses caused by electrolysis, a method which would take a great deal of time, means have been sought and found at least to check the ravages produced by electrolysis on the cable sheath.

Causes and Effects of Electrolysis:—We call electrolysis a chemical decomposition, produced by the action of an electric current. This latter penetrating through and between two metallic electrodes in some intermediate agent or an electrolyte, dissociates it into two groups of elements, one of which attacks and dissolves the metal of one of the electrodes. We have here two distinct phenomena, yet closely connected; the decomposition of the electrolyte and the dissolution of one of the metallic conductors.

In the phenomena which we are discussing, the ground plays the part of the electrolyte. Ground which is perfectly dry would be a bad conductor and would allow only minute quantities of current to pass. This condition is, however, only rarely realized; almost all ground holds more or less moisture, and certain metallic salts, which may dissolve and constitute a conducting medium capable of being electrolysed. Moist concrete presents the same troubles.

The mass of decomposed material, and therefore the proportion of metal attacked, depend primarily on the amount of current circulating in the electrolyte. If we know the strength of the flow of current passing through a known metallic surface, the law of Faraday would allow us to deduce the amount of destruction caused by any given point in the distribution system within a certain period of time. The difference of potential set up does not have a direct effect on the progress of the action, but it exercises an influence on the intensity of current. There is no minimum voltage so small that electrolysis has not resulted from it.

The attack on the cables takes place at that point where stray currents leave it to pass into the ground. These stray currents generally form a shunt for the return circuit for electric railways, using their iron rails as second conductor. Installations of this type generally connect the positive pole of the current generators to the insulated conductor on which the trolley has its contact, the negative pole being connected to the rails. The current therefore passes from the trolley into the railway motors, then into the rails, these latter being at times insulated from the ground which carries them by bed rock or some other roadbed ballast. Several roads are generally open to the current, which chooses between them proportionate with their conductivity. A portion of the current follows the rails and comes directly to the conductors connected to the negative bus bars. The rest of the current is spread in the soil which acts like a conductor of very large area and hence of low resistance. It is this fraction of the total intensity of current which makes up the stray currents; these latter returning of necessity to the rails at some point or else to some other body enclosed in the soil and connected to the negative poles of the generators.

The network of leaden cables, the water supply mains, gas mains and other underground mains with metallic surface, in general offer a much better conductor to the current than the surrounding earth. When such

distribution systems are found at certain points in the vicinity of electric railways, they gather up and carry stray currents of large intensity. Unless some direct metal communication is established with the negative bus bar, the current will escape at some point and will pass back through the soil in order to rejoin its source of energy. At such points the main or cable sheath forms the anode of an electrolytic element; it is then chemically attacked.

Lead which resists many corrosive solutions well enough, is easily attacked by the alkalis of the soil. Likewise the lead cable sheaths are sometimes attacked at the points where the stray currents enter, the lead then playing the role of the cathode. In such a case a scondary reaction takes place: the more the current circulates, the more alkaline bases are accumulated through electrolysis at the points of contact with the cables. When then through the stopping of the cars or other causes the current itself ceases to act, corrosion of the cable keeps on through simple chemical reaction. The corrosive effect may therefore appear not only at the point of entry of current but likewise at the point of egress. Finally, unless precautionary measures are taken in time, the lead sheath will be pierced, the conductors exposed to humidity and soon the cable will be useless.

Necessary Inspection:—The systematic examination known under the term "Inspection of potential" is one of the essential precautions that must be taken to guard against the danger of electrolysis. It is not only necessary to do this at the beginning of putting the cable system into operation, but to keep it up all the time, so as to be certain that there is no danger from electrolysis and that there are no stray currents.

The most efficient method of tracking these latter, is to determine the difference of potential existing between the cable sheath and a piece of insulated metal placed in contact with the ground nearby. At those points where the sheath is found to be positive in relation to the test electrode, one can expect the presence of some sort of current passing from the cable into the ground. In addition it is good practice to note the drop of potential along the different sections of cable and to measure the differences of voltage between the various sections and the rails, the metallic mains and other neighboring conductors. If the results of the examinations show that no current is passing from the cable into the ground and that the currents passing from the ground into the cable sheath do not show an excessive intensity, one can safely conclude that the cables do not suffer from electrolysis. Such inspection is above all necessary for telephone cables passing along electric railways using direct current. As extensions and new constructions of telephone cables and electric railways frequently change the electrolytic conditions, periodic examinations of the cable system at convenient intervals of time are necessary for the safety of the system.

Preliminary Verification and Final Inspection:—As soon as a cable system has been placed in service, it is necessary, if circumstances should show that there is danger of electrolysis, to make a preliminary verification or survey, whose conclusions may point to the necessity of preventive measures. These latter having been taken, the best method to test their efficiency is to make a second series of tests and compare the results with the first ones. The security of the cables having been established, it is necessary immediately to arrange for periodic inspection in order to assure oneself that there has not taken place any harmful change in the conditions about the cables. The principles of method remain the same in all cases, only the details vary, as will be shown.

The measures which must be taken are the following: (1) Differences of potential between the various chosen points in the cable system and the surrounding earth (in the preliminary verifications each cable manhole will constitute a well established testing point). (2) Differences in potential between the different sections of the cables, the conduits, metallic bridges, electric railway tracks, track of steam railways, etc., at points where the cables cross these other means of communication, or where the cables run near them. (3) Measurement of currents which pass in the cable sheaths.

In certain streets where the path of the cables lies parallel to that of the rails, the distance between one testing station and the following one should be at least doubled. Quite frequently the direction and intensity of current in the cable sheath should be determined. It will be sufficient to note the readings of a millivoltmeter connected to the ends of a certain given length of cable. From these readings and from the linear resistance it is easy to calculate that of the sheath and hence the desired intensity. At points where measures of potential indicate the existence of currents passing from the cable into the ground, it is quite advisable to repeat the measures of strength of current several times. One can thus calculate the quantity of current passing from the sheath to the ground between two given test stations in consecutive tests. It is also necessary to measure the current strength passing through the return feeders at the moment when the tests are made. If certain sections of cable are protected by insulated joints, one ought to measure the differences of potential between cable and ground on each side of the joint. All measurements must be made during the day, when the cables are in use and when the other means of transportation are used. In places situated quite a distance from the source of energy, one ought to choose a time for the tests, when the cars run over points very close to the observation stations and again after they have passed beyond the observation points.

The closer one approaches the source of energy or places where the lines converge about a common center, the more frequent will the periods of traffic become. The observer, in order to avoid making observations not agreeing with normal conditions, must study the plan and running of trains near his cables and watch the movement of trains within a certain determined radius around the observation station. The measurements should be followed out at each spot during at least the duration of a complete trip of the cars, even if the same takes an hour or more, unless previous experiments have shown that the disturbances due to the passing of the cars over certain spots cause no difference in observation within the given time.

At certain carefully chosen places one can use registering and recording measuring instruments, which will give graphic curves of potential and current intensity during a period of 24 hours or more. It will be good practice to compare the characteristics of these curves with those of other days and with those of railway traffic. One can then establish a profitable cause and effect relation. This comparison is very necessary when the stray currents may originate at more than one source. The 24 hour period observations with their records will then give the exact coefficient to be applied to the periodic readings taken systematically at different points of the cable system and will then enable the observer to obtain the exact daily averages.

If the cables should run across or near bodies of water or marshy ground, above all near brackish or salty water, the ground is a relatively good conductor and draws a great deal of current from the cable. This danger of increased stray currents is present even when the cables are protected by special conduits and embankments. It is then necessary to make a careful study of the physical nature of the ground, of the history of the vicinity and the changes all about. If the measurements are carried out at distances of at most 300 feet, there will usually be discovered a condition favorable to electrolysis. It is also wise to examine the actual state of the cable sheath every time that the electric conditions of the cable are tested. Deterioration or oxidation of metal, reduction of thickness and other changes in the sheath need not necessarily be due to electrolysis. They may be due to a simple chemical reaction. When these facts coincide with the existence of current passing from the table into the ground, one can induce a relation of cause and effect between the two phenomena.

Deductions from Observations:—When examination has shown the presence of electrolysis, means of protection must be adopted to arrest corrosion of the sheath. The proceeding generally used is based on the use of some conductor charged with attracting the stray currents from the telephone cable and avoiding the passing of this current from cable to soil. One can tell the effect of such measures in noting that the difference of potential between cable and ground has become practically negative. The use of such a conductor is practically indispensable for the protection of cables exposed to electrolysis. There are other means of protection, but these are of a secondary order and apply only to special cases.

The preliminary examination of a cable system exposed to electrolysis will show the existence of sections of cable which are positive in their relation to earth, so-called "positive ground," a term which is entirely false. After determining certain points, where the difference of positive potential is the greatest, we will have found an electric center for stray currents, where electrolysis is exerting its destructive effects. Generally the conductors are installed at or near these points. They are connected either directly to the negative bus-bars of the power station or the sub-station, across which the stray currents return, or else to a negative conductor communicating with the latter points. In certain cases this method of bonding may be applied to the rails of the electric railway system, but only under the condition, that the conductivity of the latter be perfect, otherwise the cables will be more exposed to danger than before. Whatever system be used, the potential of the bonding conductor must be low enough so that current coming from the cable be always drawn in the direction of the latter.

As to the distance between such bondings, experience must be the best guide. Unless a short length like 75 to 100 feet is used, it is best to use a fairly large number of wires and to verify through tests whether the desired result is obtained, namely the elimination of the potential of cable in reference to the ground. After the bondings have been applied, electrolytic tests are undertaken from a certain number of manholes. If the cable has not become completely negative, the bondings are reinforced by more wires placed in parallel and the tests are repeated. On the contrary, if the cable becomes strongly negative, a resistance is placed in series with the bondings, which is increased, until the cable is no more than slightly negative. After the bondings have been installed, measurements should again be taken at different points. If the cable gives negative readings with reference to the ground, it is safe to assume that there is no electrolysis.

Sometimes it happens that short sections of a cable are near a metal main, a metal bridge or marshy ground, and are then positive with respect to the ground. In such a case the cost of installing bondings can be saved by insulating the negative portion of the cable from the rest of the system, the metallic continuity of the armature being reestablished by use of an insulated conductor placed in parallel with the section of cable discussed. It may be said here that the bodies mentioned above, being excellent conductors, withdraw from the cable considerable portions of current and make the cable negative in some spots.

It may also occur that the danger of electrolysis is only local, due perhaps to a break between contacts of rails or some interruption in the return circuit of the electric railway. In such a case the seat of the trouble must be found by measurements of the drop of potential in the electric railway return circuit.

The measurements are carried out by voltmeters, millivoltmeters and ammeters. It is advisable to use instruments with the zero mark in the middle of the dial, as it is not always possible to know the direction of the current or the sense of potential. Moreover these readings may change in sense of direction from one moment to another in the course of the readings. To make simultaneous readings in two or more places it is necessary to make use of identical instruments. Voltage and current presenting continuous fluctuations, it is impracticable to compare readings furnished by different instruments of unequal periods.

To measure differences of potential between different conductors and earth, special electrodes are used, which are fastened to the end of a rod. Two of these instruments should always be carried along. The active end of one of these will be composed of the same metal as the sheath of the cable to be examined. The other must be provided with a steel point, so that one can establish a good contact with the cable sheath. The metal forming the end of the rods should be kept clean and bright. It is necessary to clean away the oxide and other products resulting from corrosion at those points in the cable surface, where the steel point is to be applied for tests.

Conclusions:—Electrolysis is the result of contact between the cable and a moist soil. The contact between cable sheath and soil must therefore be reduced to a minimum. This can be done only for short lengths, however. Although conduits in general prove good enough protectors for cables, it is impossible entirely to avoid contact between cable and ground. The precautions to be taken primarily demand good construction of conduits, carefully sealed joints and no breaks in the connections between lengths. The best conduits are those of cement blocks or concrete. The location of the cables is also important, and no telephone cable should ever be laid until a preliminary survey of the electric conditions of the region through which the cable is to go, has been undertaken.—*Annales des Telegraphes et Telephones.*

The *National Tidende* of Copenhagen, Denmark, notes the invention, by a Danish chemist, of a process by which fish offal may be made to yield not only oil, but also a solid substance, called "corimite," which is specifically suitable for electrical insulation. The newspaper states that a company capitalized at $18,750 has been formed to work the process, and that production is expected to begin during the present year.

Theoretical Depreciation

Presented to the Public Service Commission of the New York, First District

BY JAMES E. ALLISON

THE problem of depreciation in public utilities as a part of the including problem of valuation, is essentially one of economics, for it deals with those rules and factors of public regulation which affect ultimately the channels of investment of a very large portion of the capital of the country. It must be obvious that if the courts and regulating bodies so handle the problem as to deprive free and competitive capital of rewards such as would induce its entry into the public service, its flow in such channels for the future will cease or be very greatly curtailed and the results to capital already in the service will be a partial confiscation, for it will be held unwillingly where it would not have entered had it foreseen the treatment to be accorded it. It will, through governmental regulation alone, have been deprived of rewards sufficient to have induced it to have performed the services rendered to the public and its value to its owners and to any possible purchasers will have been reduced below the price at which free capital would have performed such service.

The true economic function of regulation, aside from the necessary police power to compel good and safe service, is to prevent the utilities from using their more or less inherent monopoly advantage against the consumers. But at the same time it must preserve the rewards necessary to induce the employment of free private capital. Otherwise we have a stoppage of the flow of necessary new capital and a coercion and confiscation of the capital already invested.

Every judge or commissioner can test the economic soundness of a theory by asking himself the simple question, "Would I have been willing to furnish the necessary capital for this public service under the regulation I am imposing?" If the honest answer cannot be "yes," then an economic principle is being violated and neither legislatures, courts nor commissions may long rule counter to economic laws without bringing consequences deeply injurious to the communities they are expected to serve.

Notwithstanding the apparent simplicity of the foregoing test of economic soundness, the problems involved in "valuation" (so called) for rate making or in the direction of accounts intended to show the proper "value" of a utility, have become so obscured and involved by partisan and crudely considered theories and they are, in their nature, so open to misunderstanding that even men of considerable intellectual attainment have and do now show confusion, hesitation and contradiction in their expressed opinions and rulings. The subject lends itself readily to specious reasoning and argument and the terminology is as yet so unsettled and so loosely used that sincere men frequently believe themselves to be widely at variance when, if correct and close definitions could be adopted, at least a part of their differences might disappear.

It is not to be wondered at that judges, who are not specialists on the subject, and the commissions which, under our political system, are generally composesd of men of necessarily short experience in the work, have in the past made serious mistakes. The first work in this field was unavoidably crude and was largely influenced by the fact that there were many lawyers on the commissions whose legal education caused them to rely upon apparent precedents; without complete analysis as to the soundness of the principles underlying such precedents. Fortunately, precedent itself, is varying, and much that is sound can be cited in spite of the mass of decisions and opinions which will not stand analysis.

One of the many difficulties which have stood in the way of the proper understanding of the depreciation problem is the fact that some companies mistakenly believe that their present interests lie in adopting the largest possible depreciation charge and, where the plant is growing rapidly, in the consequent accumulation of a permanent fund in the future. They of course object to the deduction from their investment on account of a hypothetical fund assumed to have been accumulated in the past; but the two positions do not accord, and they have, as a result, not been able to impress the truth of their arguments nor their own sincerity upon their judges.

There seems to be a mistaken idea among certain utility managers that they can have their cake and eat it, too. They assume that in some way this extra and useless charge in the rate can be turned into profits or dividends. Nothing could be more mistaken, unless they also assume that commissions in the future are to become extraordinarily generous toward the corporations.

The laws of most of the states having utility commisions provide that accumulations from depreciation charges cannot be expended except by consent of the commissions, and that all earnings of such a fund shall go back into the fund. Provided that the fund cannot be used for replacement, it can be of no benefit to the property or to its owners and its ownership is, for all practical purposes not in the utility corporation, but in the public as represented by the commissions. Yet this blunder is perservered in by some utility managers and, for the sake of an illusion, they persist in admitting the erroneous and ruinous principles of theoretical depreciation, generally contenting themselves with an attempt to reduce the amount of the confiscation of their property under the theory, but not fighting as they should the wrong economic principles underlying the confiscation. It is no wonder, with many of the commissions schooled in these mistaken theories any many of the companies admitting them in principle, that they are hard to eradicate and that progress toward the truth is much slower than it should be.

The claims of the advocates of theoretical depreciation can, we believe, be succinctly stated as follows:

There should have been set aside in the past from charges on the consumer certain sums which would now appear collected in a fund, and the amount of such fund should be deducted from the investment in the service of the public, so as to arrive at the amount of capital upon which the owners of the utility shall be allowed to earn a reasonable return.

The details for the calculation of such a fund and the reasons for setting it up are varied and various, but the above statement is the result of the doctrine.

This summing up of the doctrine of theoretical depreciation suggests two questions:

1st. Should the fund have been collected?

2nd. If collected, should the amount of it be deducted from cost or investment, to determine the capital upon which a return shall be allowed?

Let us analyze the first question.

If such a fund should have been created in any utility property, it could have had but three purposes:

1st. To form a reserve to be drawn on for replacements.

2nd. To counteract any lessening of value in the property as a whole.

3rd. To buy a part of the property for the future consumer out of charges assumed to have been paid by past consumers.

We believe that it can be proven that such a fund can properly serve none of these three purposes and that therefore it should not have been collected or set aside.

Let us first examine such a fund in relation to the purpose of forming a reserve for replacement.

Even among men who have given the problem some superficial study, there is a general misconception of the amount of necessary accumulation to enable a utility of any considerable size to meet all the requirements of replacement.

Of course, if a plant consisted of only one item and could all go out at once, there would be a necessity at the time of its going out to raise in some way or to have on hand a sum equal to the cost of a new plant. And some misguided individuals even now have the idea that a utility plant as a whole has a definite life and will eventually all go out at once in spite of replacements.

If a plant consisted of only two equal items of different lives, there might be a necessity of raising at one time a sum equal to 50 per cent of the investment. If it consisted of four equal items of different lives, there might be a necessity of raising 25 per cent at one time.

It should be clear that with the great number of items composing a large utility plant, there can never be any large percentage of the investment required at any one time to meet the replacements. It might be said that there could be a possible coincidence of the necessity for replacement of a number of important items. This is not probable and hardly possible under intelligent management where repairs and maintenance are properly met.

Obsolescence and inadequacy are the controlling causes of abandonment of equipment, and obsolescence and inadequacy are

conditions in which the time of replacement to meet them is more or less flexible. There is nothing more ridiculous in the whole gamut of assumptions used in reasoning on the theoretical depreciation than the one which definitely fixes the life of items of equipment where that life is controlled by obsolescence or inadeauacy. Any management of a large utility, if only half way intelligent, can so arrange its replacements that large expenditures, except in cases of violent suppression, need not coincide and that there shall be no necessity of an accumulation to meet them which will amount to any considerable percentage of the investment.

The fact is that in plants of any size and age, there is both theoretically and actually a normal condition in which the replacements come along with comparative evenness and where there can be no possible use for a so-called depreciation (actual replacement) fund of any considerable amount.

This fact does not seem to be known in many quarters where it should have been fully understood. The superficial observer often confuses in his mind the large requirements for improvements and expansion with the comparatively small requirement for replacement of the capital represented by equipment abandoned at the time of the improvement or expansion.

Diagram 1 shows the estimated future requirements for replacement in the property of the United Railways of St. Louis. The height of the vertical lines in the curve show the percentage of the whole investment which might be required in any year if the actual life of the different classes of equipment coincided with the lives usually assigned.

It is seen that at no point does there appear a necessity for a large reserve. Where there is a high point in the curve, it is caused by the coincidence of the estimated termination of life of a number of items.

Even assuming that the astrologers and prophets who pretend to foretell the exact date of the death of equipment and plants are approximately correct, it can hardly be denied that a management endowed with ordinary intelligence could prolong the life of some items of equipment and perhaps anticipate the abandonment of others, so as to make the requirements of the replacements assume a still more regular line than is here represented.

Correct reasoning on the probabilities of future replacement requirements must take into account the power of the management to counteract the effect of a coincidence of numbers of items of appreciable size going out together. There remains, then, as an element threatening the comparative evenness of replace-

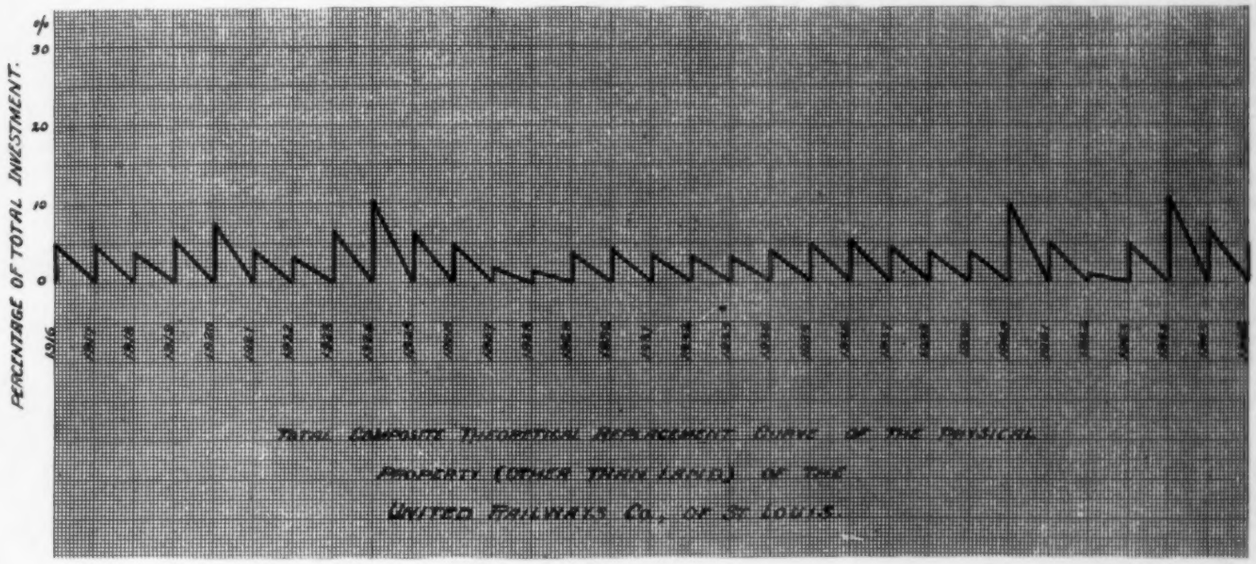


Diagram 1

Even some of the arch apostles of the "theoretical depreciation" doctrine have been forced at times to acknowledge this fact of the normal state of a property. In his report on the investigation of the Chicago Telephone Company, submitted to the committee of the city government, Prof. Edward W. Bemis in speaking of depreciation, said:

"In a new plant which has not yet reached its 'gait' of renewals, a depreciation reserve appears desirable. In the case of a company as old as the Chicago Telephone Company the time may soon arrive when renewals will take sufficient care of depreciation, as in the case of our older gas companies and railroads."

Halford Erickson, chairman of the Wisconsin Railroad Commission, another of the well-known advocates of the theoretical depreciation doctrine, says in one of his published papers:

"The large plants or combinations of plants including railways, however, are often able to so adjust their renewals that the charges for the same remain somewhat more constant from year to year. When this is the case it is not always necessary to provide for depreciation in advance in order to equalize the charges to the operating expenses or to keep up the service."

In the context of his paper, Mr. Erickson goes on to argue, as no doubt Mr. Bemis would also do, that there is some form of disappearance of "value" from the plant, owing to the abstract element of lapse of time, which should be provided for by a fund. This is an error, which we will discuss later, as it falls under another head of our analysis of the possible uses of a depreciation fund.

We have said that even theoretically the renewals or replacements in properties of any size, which have reached a normal state, can be shown to have no need of a large accumulation in a replacement reserve.

ment, only the abandonment of certain large items. Take such a thing as a building, a gas holder, a telephone switchboard, a set of large prime movers or a battery of boilers. The abandonment of any one of these items in a very small plant might represent an appreciable per cent of the investment; but as we deal with larger and larger properties, it is seen that there is no single item or set of items of equipment, which must all go out together, large enough greatly to disturb the per cent relationship between the investment and the annual or short period requirements for replacement.

Unfortunately, the members of the staff to whom such problems are intrusted, on many of our commissions, are men whose careers have been that of abstract theorists, and by this term we mean men who may have the ability to use deductive reasoning but who entirely neglect or have not had the opportunity to inform themselves as to the truth and accuracy of the assumed facts from which their theories are deduced.

They would assume, if we had a one million dollar installation in 1900 and another one million dollar installation in 1910, that each of these installations would have a definite life. They might take fifty, seventy-five or one hundred years as the assigned life. But the assumption would be, if we use the fifty years life for illustration, that in the year 1950 the company will need one million dollars for replacement, and that in the year 1960 it will need another million for replacement. They would assume that in the meantime before these dates, a fund would be piling up to meet these future expenditures.

Now, what are the facts in the history of such an installation, for example, of cast iron water or gas mains? In the first place, there is no definite life to cast iron pipe. Under favorable conditions, part of it may last for hundreds, or for all we know thousands of years.

Cast iron pipe has not been used as a material of construction for a great length of time, as compared to such materials as stone, brick or cement, but we have records of its existence in a perfect state of preservation for the full length of time since its adoption.

It is not our purpose here to make an argument to prove the long life of pipe in a gas or water works installation; but these instances go to show that there are no destructive forces exerting themselves on the whole line of a pipe installation and which will inevitably produce destruction on the whole of such installation at once, in any given length of time.

The facts are that the destruction of cast iron pipe or the causes of its removal are sporadic in their nature and that the element of age is not a controlling factor or in itself a factor at all.

Referring to our two installations of pipe of one million dollars each, what will actually happen is that in certain spots there will develop electrolytic or soil conditions, which will cause certain sections of the pipe to go out, but these conditions have nothing to do with the time the pipe has been in. In some spots the destruction may begin immediately and rapidly work to a replacement, in other spots the destructive conditions may develop later, but they may begin on the newest pipe instead of the oldest. Given time for the destructive forces to complete their work in the spots where the conditions develop, the age of the pipe has nothing to do with its destruction. A certain section of pipe may begin to deteriorate tomorrow or perhaps not for twenty or for one hundred years, or it may never be destroyed as far as we can foretell.

The same arraignment of facts can be shown as to the removal of pipe for inadequacy or obsolescence (if such a term can be used in connection with pipe). In our two installations of one million dollars each of pipe, we will find that in certain sections of the system they may become, on account of changes in the demand, too small for the service or there may be changes in pressure, etc., etc., which will require replacement in certain locations, but these replacements will bear no relation whatever to the age of the pipe. They depend upon conditions entirely independent of the date of installation of the particular pipe affected and may first affect the more recently installed pipe in preference to the older pipe. In short, there is no logical relationship between the age of water and gas mains and the time at which they must be replaced.

In our example of the two one million dollar installations, the forces of destruction, whether from corrosion or inadequacy, are not going politely to await the estimate of the accountant or engineer and allow the installations to remain intact for fifty years in order that the "fund" may accumulate. Some of that pipe is going to be attacked with considerable promptness and renewals will soon begin and will continue with approximate regularity. Parts of the system will be renewed; but unless under very unusual circumstances, it will never occur that all or even any considerable part will become a loss at one time.

This, of course, means that the replacements will be drawn continually from the revenues of the company and that there will be neither need nor opportunity for the collection of a so-called "depreciation fund," whose principal use, and in fact the very advocacy of which, is to give an excuse for declaring that the investor is not entitled to a return on his entire investment.

These plain primer-school facts, lying open upon the face of an inquiry into this history of cast iron mains, seem entirely to have escaped the observation of those intrusted by some of our commissions with the study of the problems of depreciation and depreciation funds.

This statement of the facts in the history of a system of cast iron pipes brings out the singular lack of simple and straightforward thought in much of the argument for theoretical depreciation, and also illustrates by example the truth that replacements depend on other conditions than age and that in large properties there is a constant tendency toward evenness of replacement which prevents the necessity of accumulations in a fund to any considerable percent of the investment, if at all.

There is an acknowledged law resulting from the intelligent analysis of utilities, which may be called "The Law of the Trend Toward Level Replacement."

This law is known to many and acknowledged even by such eminent advocates of theoretical depreciation as Dr. Bemis and Commissioner Erickson. With such acknowledgements that replacements in large properties can be taken care of from the annual replacement charges (misnamed depreciation charges) without the necessity of any large or permanent fund, it becomes evident that replacement can not be the purpose of a depreciation fund, and if a fund is created and is assumed to be permanent, that in itself is proof that it is not to be used for replacement and that replacement cannot be the useful purpose of its creation.

Having proven that of our three hypothetical purposes for the collection of a so-called depreciation fund, replacement can not be one of them, we come to the second hypothetical purpose, viz.: to counteract any lessening of value in the property as a whole.

The second hypothetical use for a permanent accumulation, called a depreciation fund, *i. e.*, that it is to be used to offset a diminution in value of the investor's capital in the service of the public, is the use which the name given to the fund would indicate to be its intended purpose.

To discuss such a problem in an intelligent manner it is absolutely essential to adopt a definite meaning for the words employed.

Unfortunately, in most discussions of valuation and depreciation problems, we find a woeful lack of definiteness in the use of terms, and the paper under consideration is no exception to this rule. Nearly all of the papers and discussions of the subject show the use of the word "value" sometimes in its true meaning, sometimes as a term applied to cost, and sometimes as a term employed in an empirical and arbitrary measurement of an assumed relation between cost and age. We find the word "depreciation" used sometimes as indicating the amounts set aside or which are assumed should be set aside to make replacements, sometimes in an erratic and false sense as having something to do with lapse of time in service, and sometimes in its true sense.

The authorities on the meaning of these two words are the lexicographers and the economists, and fortunately they are in exact agreement.

The Century dictionary gives the following definition of "value":

"1. Worth; the property or properties of a thing in virtue of which it is useful or estimable, or the degree in which such a character is possessed; utility; importance; excellence; applied to both persons and things.

* * * * * * *

"3. The importance of a commodity measured in other commodities (commonly represented by money) for which it can be exchanged in open market; the rates in which one thing can be exchanged against others; the command which one thing has over others in traffic; in a restricted (and the popular sense) the amount of money for which a thing can be sold; price.

"In political economy, *value* is distinguished from *price*, which is worth estimated in money, while value is worth estimated in commodities in general.

* * * * * * *

"4. Price equal to the intrinsic worth of a thing, real equivalent.

* * * * * * *

"To Value."

1. To estimate the value or worth of; to rate at a certain price; appraise; as, to value lands or goods.

The first definition of value given under No. 1 is that of an objective value or unmeasured value. No. 2 in the definitions in the Century dictionary is of the same character and is omitted here. It is evident that neither definitions No. 1 nor No. 2 can be applied to a value measured in money.

DEFINITION OF VALUE FROM "THE PRINCIPLES OF ECONOMICS," BY PROF. F. W. TAUSSIG.

"The value of a commodity means in economics its power of commanding other commodities in exchange. It means the rate at which the commodity exchanges for others. If a bushel of wheat can be exchanged for a large quantity of other things—for many pounds of iron, many yards of cloth, many ounces of salt—its value is high, the possessor of it can procure many of these things. If a bushel of wheat can be exchanged for but a few pounds of iron, few yards of cloth, few ounces of salt, its value is low; the possessor of it can procure few of these things. It is immaterial that the exchange does not take place directly, but by the process of first disposing of the wheat for the medium of exchange—money—and then procuring with the money the iron, cloth, salt, or other desired commodities. The result of the double operation is the same as if the exchange had taken place by direct barter. Only it is reached by a more convenient method.

"The value of a commodity, thus conceived, *is its value in exchange.*

* * * * * * *

"For the purpose of economics this latter sense, *exchange value*, is the most important.

* * * * * * *

"In the sense which we have adopted, *value means simply the actual rate in exchange, and there can be no value other than that registered by sales and exchanges.*

"For the purpose of economics, one meaning or definition must be selected and held to with care. In the following pages "value" will be used strictly in the sense which economists have adopted for it—*a relation in exchange.*

* * * * * * *

"For the purposes of an orderly and systematic exposition of economic principles, we shall assume for the present stability in general prices; hence that a change in the price of an article signifies a change in its value.

DEFINITION OF VALUE FROM "THE OUTLINES OF ECONOMICS," BY PROF. RICHARD T. ELY.

"*The Meaning and Significance of Value.*—One of the most fundamental of all economic problems relates to the ratios at which goods are exchanged for one another. These ratios are called *exchange values.* The exchange value of a good is the quantity of other goods that can be obtained for it.

* * * * * * *

"It is, however, customary today to express the *value of all commodities in terms of one other commodity, money.* Price is exchange value expressed in terms of money."

These authorities show that the only true definition of a measured value is that of exchange value and that the only definition of a value measured in money is the price which a commodity will command in the market. If then we are to use our terms properly and definitely, we must assume that the value of a utility, as a whole, can be nothing but its probable price on the market. The market for public utilities is of course one of investors and the value must be measured by what investors would give for the property.

A market might be cited in the municipalities, but in that case the municipality could not give less, without confiscation, than would be given by another purchaser, which brings the measure of value back to the investor.

Having established that the true value of a utility is meas-

Having said so much to emphasize the only and simple meangranted the evident truth that investors put their money into public utilities primarily for the sake of the return they will be able to obtain, it follows that the controlling and almost the only factor establishing the value of a utility property is its capability of producing earnings.

Having said so much to emphasize the only and simple meaning of the word "value," let us now define or have defined for us, the meaning of the word "depreciation."

The Century dictionary gives the following definitions of depreciation:

"1. The act of lessening or bringing down price or value. 2 A fall in value; reduction of worth. 3. A belittling or running down of value or merit; conscious under-valuation or underestimation of the merits of a person, action, or thing; unfavorable judgment or scant praise; as: 'He is much given to the depreciation of his friends.'"

The verb to depreciate is also defined as follows:

"1. To lessen the value of; bring down in value or rate; as, to depreciate goods, railroad stock.

"2. To undervalue or underrate; represent as of little value or merit, or of less than is commonly supposed; belittle.

"11. (intrans) To fall in value, become of less worth; as, a paper currency will depreciate unless it is convertible into specie; real estate is depreciating."

The conclusion from these definitions is that the noun "depreciation" means a lessening in value, and a lessening in value as applied to utilities means a lessening in exchange value or a lessening in the price which would be paid for the utility by investors.

Let us inquire then, what are the causes which might bring about a lessening of earnings and consequent lessening of value. First and foremost is a falling off of business or a reduction in rates; either of these causes is a potent factor in the lessening of value, and consequent depreciation. The problem in this case, however, is not a depreciation from lowering of rates or falling off of business, but an assumed depreciation said to be due to changes in theoretical, abstract and erroneous factors of value assumed to exist in the physical plant of the utility.

In a public utility, we have an example of the investment of money in a large collection of instruments to perform certain services. These instruments each separately continues to perform its service under proper maintenance and repair in just as efficient a manner up to the day of its removal or abandonment as at its installation; and considering the plant as a whole, when well managed, each particular unit (unless replaced while still in perfect operating condition, on account of inadequacy or obsolescence) is replaced when it begins to give a service appreciably less in efficiency than it gave at the beginning of its career. Then it is seen that so far as its contribution to the value of the plant is concerned, each unit contributes constantly its quota to that value; and the mere fact that there has been a lapse of time since the installation of the unit, does not destroy or lessen its contribution to the value of the utility working as one single aggregate machine, the sole purpose of which is to give service and by service to be able to earn returns.

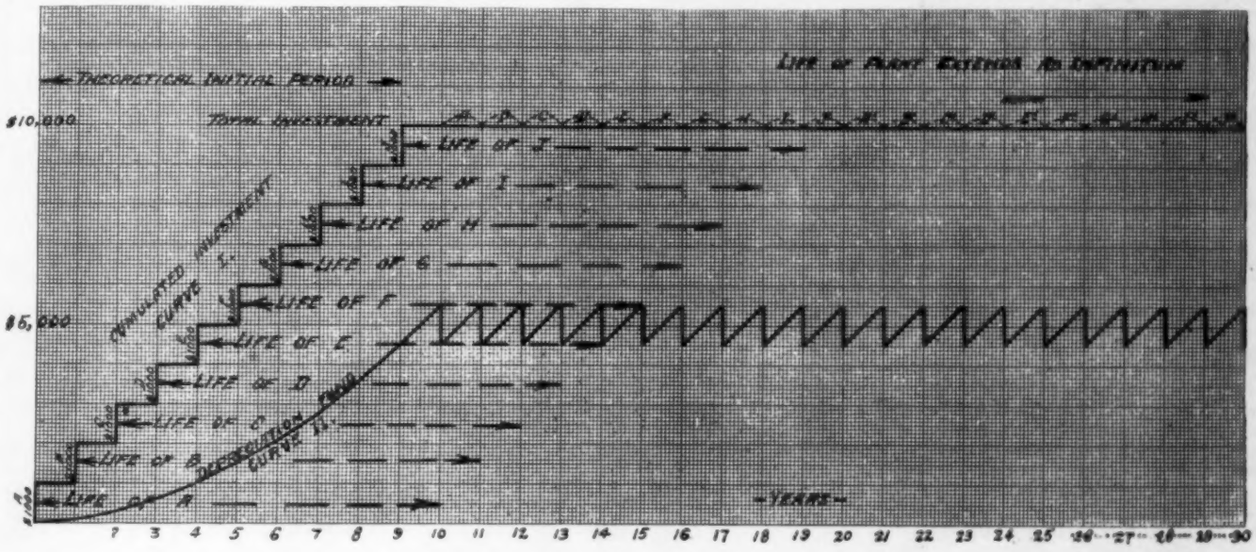

THEORETICAL INITIAL PERIOD
TOTAL INVESTMENT
$10,000
$5,000
LIFE OF A
LIFE OF B
LIFE OF C
LIFE OF D
LIFE OF E
LIFE OF F
LIFE OF G
LIFE OF H
LIFE OF I
LIFE OF J
ACCUMULATED INVESTMENT CURVE
DEPRECIATION CURVE
-YEARS-
1 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30

Diagram 2

It is true that if provisions were not made out of gross revenue for the replacement of the units as their lives expire, there would be a lessening in value, due to the fact that the investor, familiar with the plant, would foresee a lessening of efficiency and an ultimate wreck of the utility, which he could not correct or prevent without sacrificing the very return which causes value to his investment and to the utility as a whole.

But one of the few well established principles of public regulation is the right of the investor to charge in his rate an amount which will enable him to make these replacements. This right, when it can be exercised, assures a continuous ability of the physical equipment of the utility to perform its function in the earning of returns and prevents any loss of value in the utility, except such loss as comes from causes entirely outside the physical plant. In other words, it prevents depreciation or loss of value in the physical plant, *per se*, or any loss to the utility which might be caused by the physical plant.

If the replacements prevent a lowering of the ability of the plant to earn returns and hence prevent a lessening of its contribution to the exchange value of the utility as a whole, what excuse is there to assume that there is any lowering of value? What excuse is there for applying an assumed and artificial theory for reducing the true value? And what excuse for building up a fund to be used for the purpose of off-setting the results of the application of such erroneous and false calculations?

It is not contended here that the exchange value or only real value of a utility should be the figure to be taken by regulating bodies in their adjudication of rates or for other purposes coming within their powers and duties. Such an assumption would lead to the conclusion that there must be no change of rates or earnings. The regulation of public utility earnings through the regulation of rates implies a changing and adjudication of values, supposedly in accordance with justice. Where earnings and consequently values are unjustly high, they are to be reduced and where they are unjustly low they are to be increased, but values being the result of earnings can not be taken as a base.

This is so self-evident a truth that all the loose talk about "present value," "fair value," etc., etc., should not be permitted to bewilder or mislead any one.

In dealing with the idea of value of a utility, the egregious mistake is commonly made that by obtaining the value (or attempt at value) of the separate parts of the whole plant and then adding them together, a result is arrived at which represents the value of the whole utility. Weak reasoners accept this immediately by quoting the inapplicable maxim that the sum of the parts must equal the whole.

It is true of course that when all the different parts of a utility are properly located and connected, we have the whole of the physical plant of the utility. But it is not true that segregated and individual exchange value of the different parts will, when added together, equal the exchange value of the utility as a whole.

The factors which establish the exchange value of a piece of equipment, when treated separately from its place in the utility, are in no way related to the factors of value which give exchange value to the utility as a whole. The exchange value of the plant as a whole is fixed by its earning power and that is almost the sole factor which appeals to the market for utilities, while the actual exchange value of the parts by themselves is determined by the demand and supply for second-hand equipment. In fact, no second-hand exchange values are obtainable. Hence the assumption of a pseudo second-hand value based on remainder of life.

In dealing with actual values, we are no longer inside the boundaries of pure mathematics, and the mathematical axiom that the sum of the parts equals the whole does not apply. The only way the axiom can apply is to assign values to the parts in accordance with each part's proportionate usefulness in its place in the whole utility as a producer of earnings.

Practically, this is an impossible thing to do and would be useless if done. The conclusion must be that the analysis of a plant by items is useful only in ascertaining *investment;* there can be no correct separate *values* assigned to the items which will represent their true value as parts of the utility as a whole.

There is a lamentable lack of appreciation among valuators of the relation of so-called functional depreciation to the separate items and its entire absence of relation to the plant as a whole. It is due to the same inability to reason on anything larger than one machine or one class of equipment. The functional depreciation in a machine may be defined as the calculation of its expired life as compared to its estimated life, and the application of this calculation to cost, to obtain a so-called but pseudo "value." (Note—A narrower meaning sometimes applied to the term Functional Depreciation considers only the life expired due to the approach of obsolescence or inadequacy. This is not capable of estimate.)

Now, in applying functional depreciation to a plant as a whole, we are wrongly dealing with the units of equipment in the same relation as are the bolts, pulleys, bushings, etc., in their relation to the unit. If the units in the plant as a whole should be replaced with exactly the same kind of units as are discarded, which is the case in replacing the parts of the unit itself, it would seem that the plant as a whole would become obsolete or inadequate, and would have an end to its life just as the units have ends to their lives in actual practice through obsolescence and inadequacy. But, in replacing the units of a plant, we are not compelled, as we are by the rigidity of the machine in replacing its separate parts, to put back the identical article which is worn out. Replacement should be understood as replacement of capital and not as replacement in kind. In replacing the units of a plant as a whole, obsolescence and inadequacy are counteracted by changing the type or capacity of the unit. In consequence of this flexibility in replacement, the plant as a whole does not come to an end, and all the forces working for the destruction of the usefulness of the plant are thus counteracted, and its value wholly preserved, so far as physical equipment is concerned.

It should therefore be seen that while functional depreciation may be reasoned into a piece of machinery which will ultimately disappear, it cannot properly be applied to the plant as a whole. Functional depreciation, even as a theory, rests upon an assumed definite end to the life of the thing depreciated. It can not be applied to a utility which has no definite or forseeable end.

The advocates of theoretical depreciation must concede that the *value* of the utility as a whole, since it depends upon earnings, can not be used as a base for regulation; and yet they insist that the sum of their interpretation of the values of the separate parts be used as a substitute.

John Bauer, an economist, and at one time, we understand, a member of the staff of the New York Commission, in a footnote attached to a paper published in the *American Economic Review* of September, 1916, says:

"One interpretation of value as used by the courts might be the amount that the individual units of the property sold separately would bring on a free competitive market. This would be not the value of the property as a going business, but as dismembered and sold in parts at fair market prices. No such valuation could be made practically, for there is no market through which prices for various articles could be determined."

How any court could expect anything but universal financial disaster if it adopted an interpretation of value so absurd, or how any one with the least atom of fair play in his composition could advocate such a method of arriving at an earning base for a utility it is hard to understand.

The last sentence in the quotation, however, truly states a difficulty in the way of the adoption of the method.

But whether it was its absurd unfairness or the difficulty of the work which deterred them from swallowing this method whole, the theoretical depreciationists have taken only a part of it and have adopted a bastard method of assigning their estimates of separate values, which, when the separate figures are added up and called the *"value of the plant,"* results in a mongrel estimate, which can be called neither a value nor a *cost*, nor a *just amount* which would have caused the investment and performances necessary to have had the public served by the utility.

In using this piecemeal method of adjudicating the capital entitled to returns in a utility, the theoretical depreciationists will first assign a definite life to a piece of equipment. The acknowledged fact that in most cases the life of equipment cannot be foretold even within a wide range does not deter them in the least. They cheerfully manhandle an investor's capital on an assumed life of 15 years, when it may just as well be 30 or 40 years. Such small details do not bother them. They are chasing a theory and facts are of little importance.

Having arbitrarily assigned their life to the item, they find out how old it is. The life assigned is, say 10 years. It is found to be five years old. It cost one hundred dollars. The result to them is conclusive. It is worth just 50 dollars. Of course the truth is that it may be worth much more or much less than fifty dollars, when separated from the utility. As a part of the value of the utility, as a whole, its separate value can not be estimated.

Nevertheless, it is solemnly assumed that the sum of such figures give the *present fair value* of the property, and that the value of the investment *has depreciated* the difference between its cost and this result.

Let us examine briefly the process by which a depreciated value (so called) is arrived at under the workings of theoretical depreciation.

First, an investigation is made of the age (not the condition) of each item or class of items of equipment in the plant. The result, when these figures are consolidated, is a composite age in the whole plant.

Next, an estimate of the expected useful life of each item or class of items is made, and this results in a composite estimated life of the whole plant. (Note: On account of the element of varying costs the composite age and life are expressed in dollar-years. But the effect is the same. For simplicity of illustration the factors are here spoken of as "age" and "life.")

Next, the composite age is deducted from the composite estimated life and the result is a composite remainder of life, expressed in a percentage of the full estimated composite life. This percentage is then applied to a cost of the depreciable property, and the result is said to be the present value.

Whatever the order of the proceeding, the calculation can be reduced to the above formula.

A sufficient bar to the use of such a method is the fact that there is in reality no such thing as a composite life of a utility. The life of a going plant extends on indefinitely into the future with no determinable end, and to base a calculation of value upon the assumption of a remainder of life for the utility as a whole, is in the face of this fact an absurdity.

It should not need argument to show that, if renewals are made when necessary, a plant has no determinable life, and that, if there were perchance to be a theoretical per cent deduction for age, this deduction would be infinitely small applied to the really almost infinite expectation of the life of the utility.

This argument has sometimes been met by the advocates of theoretical depreciation with the statement that they are not considering renewals but only the existing physical property. But if the stand is taken that renewals are not to be considered, then the useful life of the plant is not the composite remainder of life as estimated, but its life will only extend to the time when the first vital part goes out. In other words, following theoretical depreciation to its logical conclusion, very few plants would have a value much above scrap.

So far as age and the different parts go, they produce a normal condition of the plant as to replacement, which normal condition is the only kind of plant possible of continuance and the only kind of plant which the investor's money can permanently produce.

As the minds of the advocates of theoretical depreciation seem to confuse the nature of the item of equipment with the entirely different nature of the whole utility, let us illustrate by supposing, we will say, an engine of such a nature that not only repairs can be made but also obsolescence and inadequacy be counteracted piecemeal when required. We think it will have to be admitted that such an engine would last almost indefinitely and would not depreciate provided its parts were properly renewed. Utility plants of any size are exactly similar to such an engine, and so long as they are fully kept up they do not depreciate in real value.

Much of the confusion of thought connected with the depreciation problem has been brought about by the question of charges and funds labeled by accountants depreciation funds or depreciation charges. They should be called replacement charges or replacement funds, for that should be their purpose.

When replacement is fully provided for, depreciation is counteracted, and does not exist, and so-called depreciation (actually replacement) charges should be made in rates with the sole purpose of counteracting or preventing depreciation by replacement.

By the foregoing pages, it should be clear that in a plant in which repairs and maintenance have been kept up to the maximum and where replacements have been fully made or provided for, there exists no cause, within the plant, for a lessening of value in the utility.

In other words, under such a condition, any lessening of value or depreciation can only come from causes outside of the physical plant. There can therefore be no proper purpose in accumulating a depreciation fund to meet a lessening of value in the plant.

It will hardly be conceded that, under ordinary circumstances the consumer should be expected to provide a fund to anticipate a lessening of value which might be caused by bad management or even by a falling off of business. There then remains but one other purpose for which it might be useful in connection with a lessening of value and that is to compensate the investor for an arbitrary governmental reduction of the earning power of his capital below the amount for which he would have performed the service to the public.

This is an attempt to make one blunder compensate for another. And we maintain that such is not a proper or rational purpose for the establishment of a fund.

Let us now take up the *third* hypothetical use for a so-called depreciation fund, viz.: To buy a part of the property for the future consumer out of assumed charges upon the past consumer.

It is agreed by all intelligent students of the problem that the calculation of a theoretical depreciation fund, when applied to the future of a supposedly new plant or when theoretically projected over the past of an existing plant, will produce a fund which can not be used for replacement.

It has been shown that this fund can not be needed to compensate for a lessening in value of the utility unless that lessening in value has been arbitrarily caused by the regulating authorities for the very purpose of finding a use for the fund. Then, the real result of such accumulation, if the amount of it is deducted from the earning capital of the company, is to effect a partial purchase of the plant for the benefit of the consumer.

If we imagine a case applying wholly to the future, where there might be a plain agreement between the company and the consuming public that there should be a purchase of a part of the plant by the consumer, by means of a charge in the rate over and above the requirements for a reasonable return and over and above the requirement for replacements, then there could be no criticism of the justice of the proceeding; but the fund in that case would be honestly named a "purchase fund" and it would not be necessary to resort to the deception and fraud of concealing its real and only effect, under the guise of a so-called depreciation fund, supposably collected for the purpose of preventing or offsetting real depreciation. Such an agreement however does not exist, and it is not too much to say that public officials who knowingly place the burden of the purchase or partial purchase of utilities upon the present generation for the benefit of a future generation of consumers, are exceeding their authority, unless they have been plainly delegated such powers and furthermore unless the transaction is done openly and under proper nomenclature, there is either wittingly or unwittingly an inexcusable attempt to deceive the consumer or the investor or both; and it might be a serious question whether the legislature could confer such power.

So much for an attempt to conceal a future purchase fund under the name of a depreciation fund. As to the effort to bring about a similar result as applied to the past, there is a situation so unjust that it is impossible to believe that sworn officials who have and do countenance the doctrine of theoretical depreciation can perceive the real results of its application.

We must remember that in the past the consumer gave nothing in his rate for the purpose of establishing a needless so-called depreciation fund or for what should be called a purchase fund. Theoretical depreciation was unthought of either by utility owners or by public officials, and the plain and sound view prevailed that, in a continuous business, full maintenance and replacement offset and prevented depreciation; and the fact was recognized that so long as a plant then and in the future was assured of efficiently and continuously performing its functions, there could be no lessening of value so far as physical property was concerned. It can hardly be denied by fair minded men that in the past most utility companies were working under a simple system of legal rates, which were fixed by authority without any calculation or knowledge on any one's part of any allowance for this purchase fund, falsely called a depreciation fund. The companies were allowed to charge the consumers a certain legal rate and in return were expected to give good service and provide for a continuation of good service. When this was done, the residue of profits whether large or small became the legally acquired property of the utility company or its owners. If the regulating powers thought these profits too large, they might lower the legal rate, but once they were made, the profits, if any, unquestionably belonged to the investor or the company.

It is one of the stock assumptions in the theories which we are criticizing, that the consumer should always have paid in advance for any item of equipment, before it was abandoned, and the *ex post facto* ruling is made that it was the duty of the utility owner to see that he did so, regardless of the cause of abandonment, whether wear and tear, obsolescence or inadequacy.

Let us examine the real facts. The users of the item of equipment are responsible for its wear and tear. Wear and tear is caused by its use in their service, and their rates should be charged with the cost of such wear and tear, or the expense of making good the wear and tear.

In nearly every item of major equipment of a utility, or in fact in nearly all well made machines of any sort, the wearing parts are so constructed that they may be renewed. This is a fact well known to any mechanical engineer or machinist. Machines otherwise constructed would not be accepted. This being the case, the wear and tear is, in most items of equipment, counteracted and made good during the life of the machine. An examination on the witness stand of men in charge of machinery in public utilities would prove that in nearly every case, when a machine or piece of equipment goes out of use, it is still in fit condition to perform the service for which it was originally intended, with very little, if any, lowering of efficiency. There is an exception to this rule in the individual cases of such items as railroad ties and pole lines; but in these cases, the whole equipment of poles and the whole equipment of ties may be regarded as one machine, and the repairs constantly counteract the forces of decay in such a manner as to keep the equipment fully efficient.

Conceding that wear and tear can be counteracted in well designed machines and in other equipment, by constant repair, and that that repair is borne by the rate collected from the consumer using the equipment, we then have, as almost the sole causes of abandonment of equipment, the destructive forces of obsolescence and inadequacy. Obsolescence and inadequacy are caused not by the consumers during the life of the equipment but by the new demands and new standards of the consumers coming after specific equipment is abandoned, as in the case of the abandonment of apparently efficient street railway cars of one type for the improved stepless cars. Who is it among the consumers who are benefited by the abandonment of the old type and by the adoption of the newer type? The old consumer who used the old high step car or the future consumer who will enjoy the convenience of the stepless car? It is only to meet the

demands or to improve the service of the future consumer that the earlier type of car has been abandoned. Should it be said that the past consumer should pay in his rate for the increased convenience of the future consumer, or should the charge for the abandoned property be placed, in part at least, upon the real beneficiary of the change?

This aspect of the situation does not seem to occur to the theoretical depreciationist, yet, as a question of justice, it is very simple and very plain; and instance after instance could be cited as illustrating the error in the assumption that all abandonment should be paid for by the consumer during the life of the equipment abandoned.

Notwithstanding this almost self-evident truth, it is often claimed that the replacement charges of present-day calculation should be projected into the past, as a matter of justice between consumers of different periods, that the company is responsible for not adopting this illogical theory, and that as a fund would have resulted which would have produced a part purchase of the plant, it must follow that the owners should give up a part of their property to the present day consumer on account of their neglect to rob the past consumer. This may sound somewhat exaggerated, but when the plain truth is told, it is what the doctrine amounts to.

But under the specious appearance of providing a fund for replacements or for a lessening in value, neither of which purposes it can properly serve, it is now in effect assumed by the theoretical depreciationists that the owners of a utility should have in the past set aside a fund out of their profits for the purpose of buying a part of the plant from themselves and giving it to the consumer.

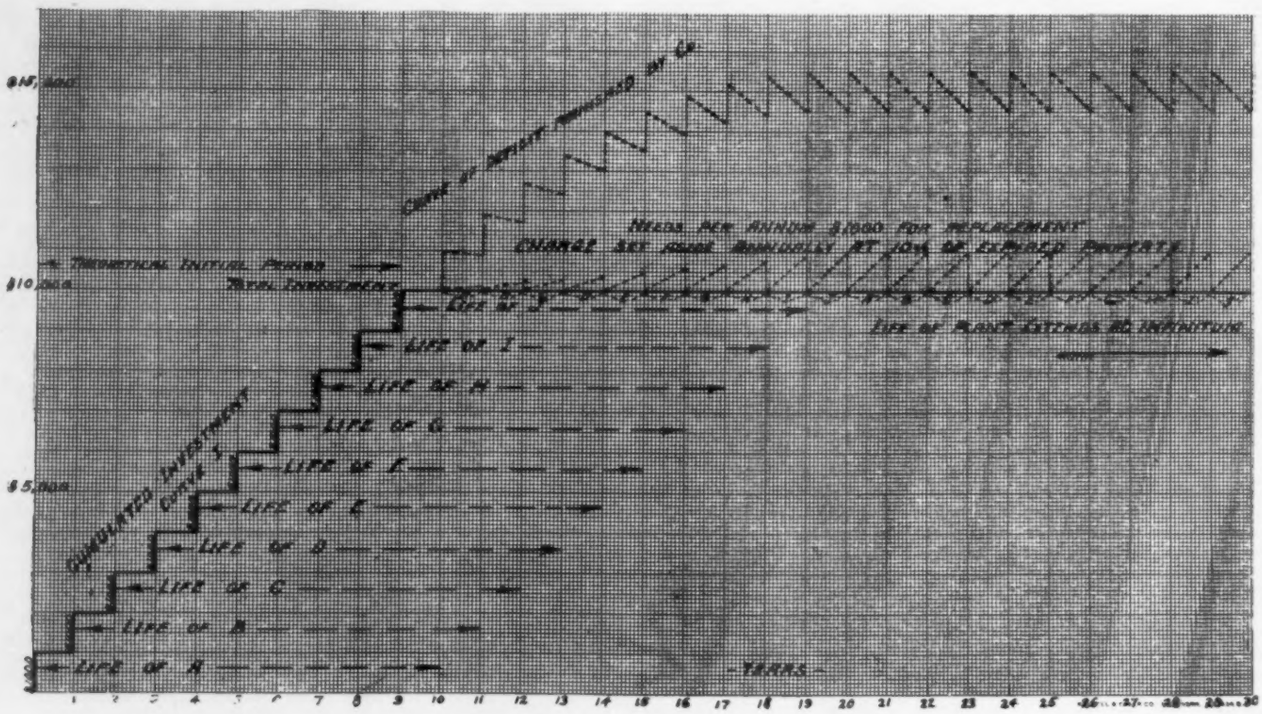


Diagram 3

The theory does not appear in this guise, but that is what it is, nevertheless; and the so-called theoretical depreciation fund, if it exists as a surplus over the needs of replacement requirements and if its amount is deducted from cost to arrive at allowed earning capital, is nothing but a purchase fund unwittingly provided out of their legitimate profits by the owners of the plant and used to buy a part of the plant for the consumer.

If the fund does not exist, so much the worse for the owner. Attempts are made to take away a part of the plant anyway, under the plea that the company should in the past have set aside a fund to make the purchase for the consumer. This, of course, is said in other words and other terms are used, but the result is the same.

There are some who flatly claim the right of regulating past profit today through the device of theoretical depreciation. Let us see where such an assumption will yield. Past profits if legal were legally acquired property, no matter whether we now think them excessive or not. Imagine giving any body of men power to take away legally acquired property because they do not approve of the way in which it was acquired. Clearly, the legislature would have no such power. Yet this power is virtually assumed under the guise of theoretical depreciation, when a company is compelled to buy a part of its own property for the consumer out of the legally acquired profits of the past. Remember that in the past the consumer gave nothing for theoretical depreciation in his rate.

We have shown that a theoretical depreciation fund can not be used for replacement, and this is conceded by most students of the question.

We have shown that it can not properly be used as a compensation for a lessening of value.

We have shown that it can not properly be applied to a part purchase of the property for the consumer, without either a usurpation of authority when applied to the future or a confiscation of the past profits of the company when applied to the past.

There can then be but one conclusion. The fund should not be allowed to accumulate for the future beyond the current needs of replacement, and its name should be changed to replacement fund. If such a fund has, through mistaken accounting, accumulated or been assumed in the past, it should be adjudged an accounting mistake, the name of the fund should be changed, and whatever property it represents should be used by its real owners, the utility company, as it may see fit.

It should follow as a matter of course, if a theoretical depreciation fund should not have been collected, that the amount of it cannot be used as a measure of deductions from the investment to reach a base for calculating reasonable returns. The arguments used to show that there could be no proper purpose in collecting it are essentially the same as the reasons advanced to show that its calculated amount cannot properly or reasonably be used to arbitrarily decrease the earning power of the investment. Nevertheless, in order to present the problem from a slightly different angle than heretofore, we append the following succinct statement:

First. The theory that the plant is not new and therefore not *worth* as much as new.

An efficient, well maintained plant in its permanent condition may be and generally is *worth* much more than new, at any rate the *worth* or exchange value depends on earnings and can not enter into rate cases, and rate cases are the main purpose of "valuation."

Second. The theory that part of the life of the plant as a

whole has been used up and therefore a part of the capital has been withdrawn.

This is erroneous, because the plant is constantly being renewed and theoretically is no nearer its end at one time than at another.

Third. The theory that a depreciation fund based on the estimated lives of the separate items and set aside from their installation is necessary to the continued efficiency and life of the plant and that if this fund is not so set aside it is a withdrawal or impairment of capital.

This theory is erroneous from the fact that such a fund is not necessary and therefore the lack of it is not an impairment of capital nor in any way detracts from the value of the utility itself. Correct depreciation (replacement) charges will not accumulate over a long period but will be used up in replacements.

Fourth. The theory that destruction of parts should have been charged off before they ceased giving efficient service, on that ground that as a matter of justice between different generations of consumers it was the duty of the owners to see that all abandonments were charged to the consumers preceding the date of each abandonment.

Such accounting would, in the first place, have been an impossibility, and in the second place, even if possible, it would have worked injustice instead of justice between the consumers of different periods. It cannot, therefore, be assumed that any such duty rested upon the owners of the utility.

Fifth. The fifth theory is simply one of reclaiming past profits because they now seem to have been greater than would be allowed in the future. In other words, it is claimed that because there were large profits, the past consumers have bought a part of the plant for the future consumers.

This is the ground of defense to which advocates of theoretical depreciation can generally be reduced. It of course is begging the question of depreciation; for past profits have nothing to do with the amount of capital now represented by the plant owned by the investors, nor with the present value of the property. When stripped of its masks, the theory is one of bald socialism.

Except by contract of charter or franchise, and, with the sole exception of the Massachusetts Sliding Scale Act, there does not exist in the United States, so far as we can learn, any law authorizing the direct regulation of the profits of utilities; and whatever elements may be considered by a commission, and whatever effort may be made to have a proposed rate bring a certain net profit, the legal powers of the commissions stop at the fixing of the rates. These rates may bring more or less profit than is intended, but whatever the profit is it belongs to the owners of the utility. As we have said, the regulating powers may cut down the profits by cutting down the rates, but they cannot, except by some specious and illegal device, take away those profits, once they are made.

The fundamental truths of the question are these and they are very simple.

Capital is in the service of the public so long as the property representing it is in the service and doing efficient duty; and it follows that returns must be allowed on the full amount serving the public or confiscation will result to capital already invested and new capital will refuse to enter.

The only time when physical plant is depreciated, or more correctly stated, when it causes depreciation, is when it gives inefficient service, i. e., when the investment in it is inefficient.

In such a case, the remedy is not permanent reduction of returns to the capital by reduction of the rates but cessation of returns, through the employment of earnings for rehabilitation until the plant and capital are made efficient.

As a final chapter in our discussion of principles, we wish to show by means of simple diagrams that theoretical depreciation, in so far as it contemplates an assumed fund accumulated in the past, is only an ill considered theory and that, even theoretically, its conclusions are wrong, when the investigation or analysis is carried over the successive steps which should be taken before the rational results of the theory are reached.

In Diagram 2 we have assumed a hypothetical property of ten thousand dollars, resulting from successive investments of one thousand dollars for a period of ten years. The assumed conditions are of course extremely simple, but it would be impracticable to diagram anything as complex as even the simplest of any actual properties of any size. However, the hypothetical case here shown will illustrate broadly the theory, and is analogous to the principle of its application.

In Diagram 2 the accumulation of investment units *A*, *B*, *C*, *D*, etc., of one thousand dollars annually are represented by Curve I, in which the property is shown increasing from the first to the tenth year. The life or average life of each successive installation is assumed to be ten years, and is diagramed by the arrow-pointed lines. "Life of *A*," "Life of *B*," etc., etc. The successive renewals are indicated by the dotted loops: Loop "*A*" representing the renewal of installation "*A*," loop "*B*" representing the renewal of installation "*B*," etc., etc.

Curve II represents the theoretical accumulations and withdrawals of an annual replacement or depreciation charge of 10 per cent of the property in the service at any time. The first year there is set aside 10 per cent of one thousand dollars, the second year 10 per cent of two thousand dollars, and so on until the full ten thousand dollars is invested, when the annual amount set aside is one thousand dollars.

It is seen that on account of the assumption that there are no renewals until the end of the tenth year. Curve II shows an accumulation at that period of five thousand five hundred dollars, or 55 per cent of the property. At the end of the tenth year there must in this theoretical example be a renewal of installation "*A*," which brings the fund down to four thousand five hundred dollars. But the annual charge now amounts to one thousand dollars, so when installation "*B*" is renewed, the fund again has mounted to five thousand five hundred dollars; again it sinks to four thousand five hundred, and thus theoretically continues to infinity, oscillating between 55 per cent and 45 per cent of the property. (Note: For simplicity, scrap value is omitted from the calculation.)

It appears then that an average fund of 50 per cent has been created, which theoretically is permanent, and cannot be used for purposes of replacement.

In contemplating his hypothetical theoretical fund, the depreciationist forgets or refuses to take into account the well-known truth that in most instances the early years of a utility are a struggle for existence, and that there is seldom any money set aside, even for purposes of actual necessity. But even if the ability to have set aside such a fund is admitted, the situation is not changed in the least.

The theoretical depreciationist forgets or refuses to acknowledge that there could have been no duty on the part of utility owners to set aside a fund which could not be needed for its only legitimate purpose—that of replacement. He forgets, or refuses to admit, that no sane person in the past could have contemplated the necessity of providing for an assumed arbitrary cutting down of the earning power to a return based on less than the investment. Even if such things as theoretical depreciation were known in the initial stages of most of our utilities, the very clear provisions of the statute, in New York at least, should now protect them against its application.

But above all the theoretical depreciation seems to have overlooked entirely the fact that the consumers in the initial stages of the enterprise under discussion were under no obligation to pay for a great part of the replacements made necessary by obsolescence and inadequacy caused by succeeding consumers. The theorists have gone no further than to assume that the initial consumers should have shouldered the burden of the succeeding ones. They do not seem to have attempted to analyze this assumption. When looked at squarely, it would seem that the weight of argument, as we have pointed out in preceding pages, is entirely in favor of the justice of placing the burden of renewals caused by obsolescence and inadequacy upon the users of the new equipment, rather than upon the users of the abandoned equipment.

If this theory had been adopted, and we submit that it is the more rational of the two, let us see by diagraming our same simple example, what the results would be.

We are assuming here theoretically that all wear and tear has been borne in the past, that the abandoned equipment is in the same efficiency of condition as when new, and that the sole cause of abandonment is obsolescence or inadequacy. We do not claim that in practice such is always the case, but the assumption helps to more clearly bring out the results of admitting the real truth, that not all the replacement charges for equipment should be taken from the period before the abandonment.

In Diagram 3 we illustrate the same property as in Diagram 2, but it is here assumed that the collection of the 10 per cent replacement charges begins on each installation, only after it has been abandoned and replaced. The annual amounts of these charges, as shown by the curve placed immediately above the ten thousand dollars investment line, begin with one hundred dollars for the eleventh year, as payment on *A* installation, two hundred dollars in the twelfth year as payment on *A* and *B* installation, and so on increasing by one hundred dollars each year until the full annual charge of one thousand dollars is reached at the twentieth year.

But while this method of collection might be in accord with strict justice as between consumers of different periods, we are confronted with the fact that, at the end of the tenth year we need one thousand dollars to replace installation *A*, which must be furnished by the company and forms a deficit as shown in

the top curve, which by the end of the eleventh year is reduced to nine hundred dollars by the collection for that year. Then there is need for another thousand dollars to replace installation *B*, and so on following the curve of deficit furnished by the company, until it is seen that at the twentieth year the company, in taking care of the deficit in replacement charges, has added to its investment a permanent sum fluctuating regularly between five thousand five hundred dollars and four thousand five hundred dollars, or between 55 per cent and 45 per cent of the cost of the existing property, if inventoried.

We have here two theories for the meeting of replacement. In the first one it is assumed that the companies in the past carefully charged up to the wrong people provisions for conforming to a theory which we all concede they did not even know existed.

In the second theory, we have a condition which comes very much closer to what has actually happened, although we do not claim that there was much conscious effort on the part of the companies to conform to this or any other theory. But the circumstances of the earlier periods of most utilities and the personal knowledge of nearly all men experienced in the utility business teaches that recoupment after the abandonment, has been more relied upon than provision for it before it occurred. These managers of the earlier utilities were probably not consciously weighing questions of delicate justice between different generations of consumers. The humor of such an assumption is apparent; but it cannot be denied that, in acting as in most cases they did from compelling circumstances, they have come closer to accomplishing this delicate piece of public welfare work than have the theorists with all their self-consciousness of personal disinterestedness.

In addition to the fact that circumstances in the initial stage of utilities generally forbid the accumulation for abandonment before it takes place, there is the general business principle that property destroyed or abandoned in making improvements of any sort is to be paid for out of the future profits of the enterprise. If a man tears down a ten thousand dollar house in putting up a one hundred thousand dollar apartment or store, he expects the profits from his new building to pay for his destruction of the old. We do not give this as a principle always applicable, but it would certainly be the viewpoint of the older utility man before the days of utility regulation.

It is seen from Diagram 3 that if the perfectly correct and just method of charging obsolescence and inadequacy to the consumer following the abandonment is rigidly enforced, the result will be that the company will have to furnish a further investment of nearly 50 per cent of the physical property.

In other words, in the instance diagramed, the company, in order to carry on the service, would have to have fifteen thousand dollars of capital invested, of which only ten thousand would appear in plant. This process has undoubtedly gone on very generally among the utilities, and is the explanation of many a bond issue, or the sacrifice of equity by the owners of the plant. It can account for much so-called water, but unfortunately most of the companies have not as yet come to the point where they can so analyze their replacements as to claim with some assurance of success, that there should be an extra allowance of earning power for capital invested in deficit of replacement charges, instead of a deduction for an assumed surplus as is claimed by the theoretical depreciators.

In our Diagram 3 we have assumed that the sole factor in abandonment is obsolescence or inadequacy. This is of course the extreme illustrative assumption, but it is not far from the truth. At least we can safely say that it is the controlling factor in abandonment. We can also say, without fear of successful contradiction, that past consumers should not have been charged with the expense of abandonment, of which they were neither the cause nor the beneficiaries.

It should be evident from the foregoing that the theorists have not even followed their theory correctly. If they had, the problem now would be: how much shall we add to the inventory to determine the capital justly entitled to returns, instead of the present erroneous and unjust efforts to make as great a reduction as possible, and to create a situation economically unsound, forbidding to the entrance of future capital and confiscatory to that already engaged in the public service.

Mishawaka Emulates South Bend

A proposition to consolidate the rival telephone companies at Mishawaka, Ind., came up for action before the city council at a recent session in the shape of an ordinance presented at the instance of F. S. Harris, representing the Home Telephone Company. The instrument was given its first and second reading and then referred to the committee on ordinances.

Statement of the ownership, management, circulation, etc., required by the Act of Congress of August 24, 1912, of TELEPHONE ENGINEER, published monthly, at Chicago, Ill., for October 1, 1917.

State of Illinois, County of Cook, ss.

Before me, a Notary Public in and for the State and county aforesaid, personally appeared E. R. Mock, who, having been duly sworn according to law, deposes and says that he is the Business Manager of TELEPHONE ENGINEER, and that the following is, to the best of his knowledge and belief, a true statement of the ownership and management of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in section 443, Postal Laws and regulations, printed on the reverse of this form, to wit:

1. That the names and addresses of the publisher, editor, managing editor and business manager are:

Publisher, ELECTRICITY MAGAZINE CORPORATION, 1251-1256 Monadnock Bldg., Chicago.

Editor, PAUL H. WOODRUFF, 7025 Yale Ave., Chicago, Ill.

Managing Editor, PAUL H. WOODRUFF, 7025 Yale Ave., Chicago, Ill.

Business Manager, E. R. MOCK, 9345 Pleasant Ave., Chicago, Ill.

2. That the owners are: (Give names and addresses of individual owners, or, if a corporation, give its name and the names and addresses of stockholders owning or holding 1 per cent or more of the total amount of stock.)

ED. J. MOCK ESTATE - - 9345 Pleasant Ave., Chicago, Ill.
B. C. SAMMONS ESTATE - - - - - - Blue Island, Ill.
JOHN CROCKER - - - - - - - - - Maroa, Ill.

3. That the known bondholders, mortgagees, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities are: There are no bonds, mortgages or other securities outstanding against TELEPHONE ENGINEER.

4. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him.

ELECTRICITY MAGAZINE CORPORATION,
E. R. MOCK, *President*.

Sworn to and subscribed before me this 25th day of September, 1917.

(Seal) LEONA J. EKSTROM.

My commission expires Aug. 17, 1918.

Sell Numbers, Like Japanese

The sale of telephone numbers by subscribers in San Antonio, Tex., who are leaving the city is not recognized by the Southwestern Telephone Company, and persons buying these numbers are out the money they pay for them and do not get the service they expect, according to a statement made by J. V. Hucker, local manager of the company. Mr. Hucker said it was unfortunate that unsuspecting persons, who wanted telephones and did not want to wait their turn through the proper channel by making application to the company, had purchased numbers from subscribers who were leaving the city or for other reasons were giving up their telephones. Some persons have paid as high as $15 for telephone numbers which they cannot use and are unable to get their money back because those who sold them have left the city.

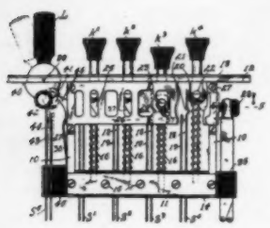
The telephones and the numbers are the property of the company, and according to Manager Hucker, in each contract made with a subscriber the company reserves the right to change the numbers of the telephones any time. A telephone is not of much value to a person if it is listed in the name of some other person, and if the company refuses to transfer the telephone and number to the person buying them the purchaser is the victim. Mr. Hucker said it is not fair to other subscribers and those on the waiting list, aside from the illegality of the sale of the telephone company's property by private individuals.

It is understood a large number of sales of telephone numbers has been made, many of them having been reported to the company after the deal was consummated by purchasers.

Telephone Patents Issued Recently

A Brief Digest of those Current Specifications Most Interesting to Telephone Men

BY DAVID S. HULFISH



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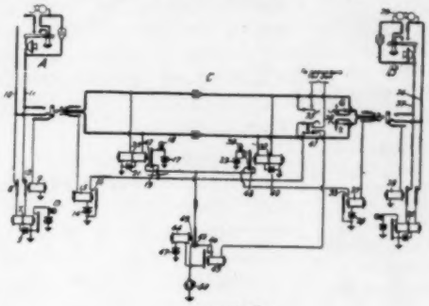

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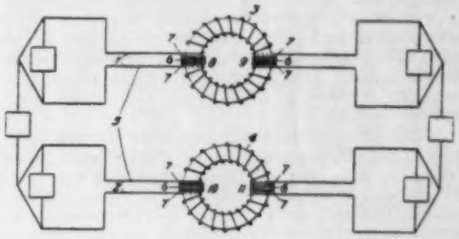


1,231,516.

NO. 1,230,117. Switchboard System. Issued to H. P. Clausen, assignor to Western Electric Company, Inc., New York, N. Y. The operator shall not listen in upon two cord pairs at the same time. When answering plug is inserted her telephone is connected to it and a device common to all the cord pairs disables all of them but the one just answered.

1,230,170. Semi-Automatic Exchange. Issued to M. L. Johnson, assignor to Frank B. Cook Company, Chicago, Ill. Automatic call distributing switches are arranged to pass calling lines to operators; overflow switches are provided to care for calls when all the operators and their switching devices are occupied.

1,230,410. Ringing Key. Issued to William Kaisling, assignor to Kellogg Switchboard & Supply Company, Chicago, Ill. A party line key with a button for each party on the line has separate springs for selecting the ringing generator but only one pair of springs for switching the speaking wires of the cord pair; a slide along the row of buttons operates the last pair of springs no matter which ringing button is pressed.

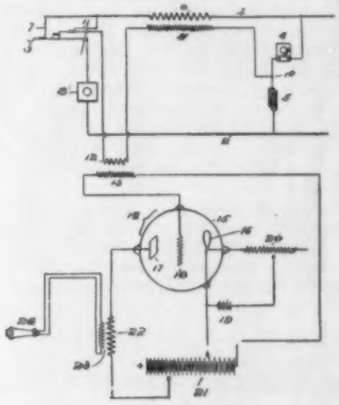
1,230,564. Busy-Tone System. Issued to H. P. Clausen, assigned to Western Electric Company, Inc., New York, N. Y. The act of making the busy test upon the called line sets up relay conditions to give the busy tone to the calling line. The tone then may be released if the calling party works his hook to indicate that he desires to speak with the operator.

1,230,565 and 1,230,566. Ringing System. Issued to H. P. Clausen, assignor to Western Electric Company, Inc., New York, N. Y. When the ringing key is pulled the current is sent to that plug of the pair upon which the subscriber's telephone is upon the hook. This directing is controlled by relays which in turn are controlled by the subscriber's hook switch.

1,230,582. Lamp Signal System. Issued to L. H. Johnson, Bloomfield, N. J., assignor to Western Electric Company, New York. When both telephones are hung up the signal lamp is connected to a commutator which flashes it, thus distinguishing from a steadily glowing ringing lamp. The operator therefore does not ring back a subscriber who has finished conversation.

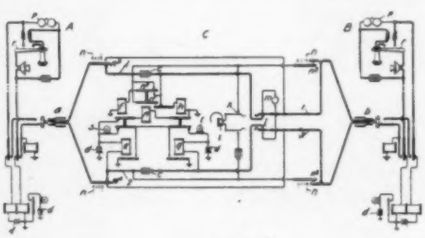
1,230,639. Semi-Automatic System. Issued to B. D. Willis, assignor to Automatic Electric Company, Chicago, Ill. A lamp signal system whereby the B-operator signals back to the reversal being effected in turn by the act of answering by the called telephone set.

1,231,013. Linefinder System. Issued to C. L. Goodrum, assignor to Western Electric Company, Inc., New York, N. Y. A system of power-driven linefinder switches and circuits for them, for use in connection with automatic switching apparatus.



1,231,704.

1,231,516. Phantom Loading Coil. Issued to William Fondiller, assignor to Western Electric Company, Inc., New York, N. Y. The loading coils are toroidal in shape, but are cut through the middle and the cut ends bridged together each half to itself, each half being then connected in one wire of a physical circuit.



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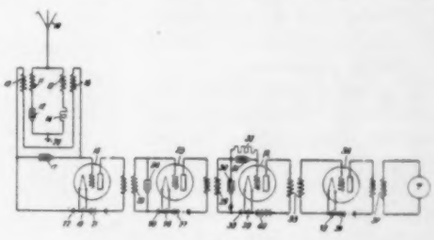
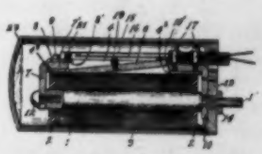


1,231,084.



1,232,044.

A-operator when a line is tested and found busy, the system being worked in connection with automatic switches at the B-board to select the desired line.

1,230,694. Automatic System. Issued to E. D. Fales, assignor to Automatic Electric Company, Chicago, Ill. A circuit for connecting and working together the old-style three-wire Strowger system in the same office with the new-style two-wire Strowger system circuits.

1,230,835. Meter. Issued to Garrison Babcock, assignor to Telechronometer Company, Rochester, N. Y. A meter at the telephone set is partially operated by the lifting of the telephone receiver, and then is further operated by the reversal of current in the line loop, the

1,231,764. Telephone Speech Relay. Issued to Fritz Lowenstein, New York, N. Y. An exhausted container has an anode and a cathode in it and included in an electrically energized circuit. A modifying or controlling device is placed between the anode and cathode and connected to a source of potential more negative than the cathode. The received weak speech currents are applied to the middle modifying device and the

strengthened currents are taken from the anode and cathode to the telephone receiver.

1,231,984. Wireless Telephony. Issued to H. D. F. Arnold and H. W. Nichols, assignors to Western Electric Company, Inc., New York, N. Y. The received waves from the antennae are taken through dampening repeaters of the vacuum type, the several repeaters having widely different damping effects, and a receiving circuit arranged so that the branches of the repeater circuits oppose each other.

1,232,044. Alternating Current Relay. Issued to William Kaisling, assignor to Kellogg Switchboard & Supply Company, Chicago, Ill. This relay responds to alternating current through its winding. Its heavy armature is poised between two angular pole pieces, and the armature is swung at about the middle point, the spring-striker of the armature being also near its middle point. The armature thus is given a very slow movement in returning to normal and does not return between current cycles.

1,232,087. Automatic Register. Issued to F. N. Reeves and A. E. Lundell, assignors to Western Electric Company, Inc., New York, N. Y. This telephone exchange has a call sender at the subscriber's telephone and has recording registers at the central office. The call sender at the telephone sends the number to the recording register at central and the recording register at central then operates in due course of time to operate and control the automatic connecting switches to give the desired connection to the calling party.

1,232,250. Semi-Automatic Exchange. Issued to A. H. Dyson, assignor to Western Electric Company, Inc., New York, N. Y. The operator at the central office makes a mechanical record of the desired line; selecting switches then select both calling and called lines and connect them together for conversation, thereby releasing the first automatic switches through which the line called the operator.

1,232,279. Linefinder System. Issued to C. L. Goodrum, assignor to Western Electric Company, Inc., New York, N. Y. In a set of linefinders the group of trunks serving a group of lines is divided into subgroups and the subgroups are given preference to different lines, thereby having the effect of searching the group of trunks of the large group in different order.

1,232,338. Linefinder System. Issued to J. W. Lattig and C. L. Goodrum, assignors to Western Electric Company, Inc., New York, N. Y. As each linefinder starts to pick up a line, the starting circuit is passed to the next linefinder, but additional means is included in the system to prevent the second linefinder from starting at once.

1,232,345. Semi-Automatic Exchange Indicator. Issued to A. E. Lundell, assignor to Western Electric Company, Inc., New York, N. Y. In a semi-automatic exchange, where the operator at a keyboard sets up automatic switches, an indicator is provided to indicate to the operator the number which she has set up upon the switches.

Lima District Elects Officers

At the election of district officers for the Ohio Independent Telephone Association, the district meeting being held in Lima October 4 at the Elks' Home, George H. Metheany, manager of the Lima Telephone and Telegraph company, was unanimously re-elected vice-president. G. W. Vernor, of Findlay, was again chosen secretary, almost unanimously. There are a vice-president and secretary in each district who carry out the work of the state association under the state president.

At the election of county chairman, two men are named from each county in the district. Mr. Metheany was elected with C. C. Heller, of Beaverdam, Allen county. In Auglaize county, Walter Fleming was chosen with R. K. Judy, of St. Mary's. G. W. Vernor, of Findlay, and Clint Stoker, of McComb, will serve for Hancock county; W. A. Norton, of Kenton, and H. A. Clark, of Ada, Hardin county; J. F. Mallahan, of Pandora, and C. G. McClure, of Columbus Grove, Putnam county.

The following counties are included in the Lima district: Auglaize, Hancock, Hardin, Mercer, Putnam, Paulding, Van Wert, Wyandot, and Allen. The state is divided into nine districts, Lima being one of the largest ones, and district meetings are held in various sections of the state, during the first two weeks in October.

The meeting was welcomed to Lima by Attorney D. J. Cable, who has been interested in Independent telephone for many years. Mr. Cable also urged the managers and executives present to do everything possible to assist in the second Liberty bond sale. He made a plea for the support of the Red Cross in its campaign of mercy.

S. S. Wheeler gave the opening address. Other speakers during the morning were: C. Y. McVey, president of the Ohio State Telephone Company, of Columbus; Frank L. Beam, president of the association; Mr. McKinney of the commercial department of the association, Columbus; Mr. Strayer, Bellefontaine, and D. J. Cable, Lima.

Among those men who spoke on the program during the afternoon were: H. A. Christy, of the Lima company, who discussed "Accounting" from a number of interesting angles, and J. A. Harrison, also of the Lima company, who gave an interesting talk on "Traffic."

The meeting carried special significance this year, as the present conditions in the business demands a thorough discussion of many phases of the telephone business, of vital interest to public, stockholders and all departments. At present the business in general is affected by national legislation and the army draft is taking hundreds of fine linemen and other workmen from the business, notwithstanding the numbers that have enlisted. Two wire companies for the Reserve Signal Corps, Central division, have been organized entirely from Independent Telephone men of Ohio, it was pointed out at the meeting. Telephone companies, with the added high cost of materials have the war tax bill to face, also, it was stated.

More than 60 representatives of Independent telephone companies in the district attended the sessions.

Long Distance Improvement?

San Francisco papers announce the invention of a new device for the clear transmission of the voice over practically unlimited distances of surface wires or submarine cables by Dr. S. N. Barusch of that city. By means of the new device the cities of both sides of the world may be brought into telephonic communication, according to the inventor. Dr. Barusch intends to offer his discovery to the government.

Experiments have been carried out over wires and cables of varying distances from thirty to 100 miles and over the experimental artificial lines up to distances equal to 3,000 miles, and have given such positive results that engineers of the government and of two large public utility corporations have interested themselves in the invention.

At the present time, in commercial conversation over long-distance lines, it is necessary to install repeaters at intervals to bring the voice up to strength again. According to Dr. Baruch, his system makes these repeaters unnecessary.

The results obtained by Dr. Baruch are said to be the same that Brigadier General G. O. Squiers, head of the United States Army Signal Corps, has been attempting to secure over the Sitka-Seattle cable.

Success has a way of standing back and watching a man do a few stunts before she accepts him.

Public Utility Commission News

Reports Concerning the Activities of State Regulating Bodies in the Telephone Field

California

THE Santa Barbara Telephone Company has filed with the state railroad commission its answer to the complaint of certain residents of Hope district against rates charged under the consolidation. The answer alleges that the rates are no higher than those charged for similar districts in the county, within the same radius from the central exchange.

The hearing has not yet been held, and meantime it is understood that a proposed compromise is being considered by some of the complainants and opposed by others who have ordered the telephones out.

Justice of the Peace I. Mayfield, of El Centro, acting as a private citizen and a subscriber of the Imperial Telephone Company, announced his intention to file with the commission a complaint against the telephone company protesting against a charge of $3.50 levied for a "reconnection" of his residence telephone.

The rules of the company require a payment of $3.50 for installation of a telephone, or the replacement of an instrument that has been removed from the building; and payment of $1.00 for reconnecting service after it has been discontinued temporarily due to the absence of the subscriber, but with the instrument still in the building. Justice Mayfield said the company had charged him $3.50 for connecting his telephone, which he had not had in use for two months, and he claims that the fee should be only $1.00, according to the company's own rules. He said he expected to make a test case with a view to benefitting the public.

Florida

It is ordered by the Railroad Commission of Florida that the application of the G. & J. Telephone Company for authority to discontinue service to East Point from its Apalachicola exchange be denied.

Illinois

The Illinois Independent Telephone Company filed an application with the State Utilities Commission for leave to increase its rates twenty-five per cent, which shall be returned to patrons as a discount for the payment of tolls promptly. The petition was filed by Former State Senator Berry, attorney for the company.

The Commercial Telephone and Telegraph Company hereby gives notice to the public that it has filed (jointly with the Illinois Independent Telephone Association) with the State Public Utilities Commission of Illinois an application for permission to increase the rates for service in Grayville.

This application asks permission to increase the rates for all classes of service 25 cents per month per telephone, with a further provision that in case the present rental charge is paid on or before the 15th of the month, the increase of 25 cents applied for before the State Commission will be given as a discount, leaving the present rates the same if such payment is so made.

The petition of the reorganization committee of the Western Illinois Telephone Company to sell its toll lines at Plymouth to the Mississippi Valley Telephone system of Hancock county was heard before Commissioner Dempsey of the Public Utilities Commission.

Objections to the allowance of this petition were filed by the Farmers' Telephone Company of Plymouth. The controversy, as set forth by the latter, arises over the construction of a contract of sale formerly entered into by the Western Telephone system and the Farmers' line in which the former sold the latter its system at Plymouth. The Farmers' Company contended that under the terms of the contract, this sale included the toll lines that are now sought to be sold to the Hancock county company. The Western system takes the position that this toll line was excepted from such contract of sale.

Indiana

The Home Telephone Company at Steuben, Ind., has received the new schedule of rates authorized by the Indiana Public Service Commission. The following are the increases:

Business telephone, raised from $18 to $24.
Single line residence telephone, $12 to $18.
Four-party line residence, $12 to $15.
Rural party line, $12 to $15.

The above rates are subject to a discount of 30 cents a quarter for prompt payment. There is no change in the toll rates for long distance service.

Some changes were also made in the established charges. Among them a summer rate for cottages was fixed at $4 for first month, $3 for second month, and $2 for the third month.

Payments must be made for rentals on the notice of the company, and on failure to make such payment within ten days, the companay may disconnect the telephone and charge $1 for renewing the service.

The increased revenue will enable the company to go ahead with much-needed improvements, and improved service may be expected.

The city council of South Bend having unanimously voted to pass the ordinance merging the Home and Bell Telephone Companies in accordance with the wishes of the officials of those companies, the matter will now be referred to the Public Service Commission of the state.

A petition for authority to charge five cents toll for telephone calls from Bristol to Goshen and Elkhart has been filed with the Indiana Public Service Commission by Fred J. Hilbish, owner of the Bristol Telephone Company. An increase in rates to telepnone subscribers is also asked, although in most instances the proposed rate provides that the increase be returned as a rebate if paid before the 15th of the month in which it is due.

Increase in cost of material and operating expenses are given by Mr. Hilbish as the reason for the desired increase. The toll charge to Goshen and Elkhart, it is said, would eliminate many useless and lengthy calls, and provide open lines for important messages.

Although the Home Telephone Company of LaGrange filed a petition several months ago asking for a

raise in rates, the Public Service Commission has made no decision, and may not until the first of the year.

An auditor in behalf of the commission examined the books of the Home Company a few weeks ago, compiling information to be used in the consideration of the petition for a raise in rates, and he complimented the office managers on their system of bookkeeping, saying that it was one of the most accurate he had ever seen, and much better than the system used by most of the telephone companies of the state.

The Public Service Commission has granted a raise in rates to the Angola Home Telephone Company. The increase is as follows:

Business telephone, raised from $18 to $24.
Single line residence telephone, $12 to $18.
Four-party line residence, $12 to $15.
Rural party line, $12 to $15.

The rates are subject to a discount of 30 cents a quarter for prompt payment. No changes in the toll rates for long distance service have been made.

The Union City Telephone Company is asking the State Public Service Commission for the privilege of advancing its rates. The increased price sought will affect only recent and future customers and does not apply to those who have been subscribers for its services twelve months or more.

Massachusetts

The Public Service Commission will uphold the New England Telephone Company in the controversy with garage owners, druggists and saloonkeepers who have complained against the non-listing of their pay station numbers in the new telephone directory.

This was the statement of William H. O'Brien, chief of the Bureau of Telephones and Telegraphs, within whose jurisdiction the complaints have come. There are considerably more than 100 of these out of several thousand pay stations in the city.

"The installation of pay stations," Mr. O'Brien said, "is nothing more nor less than a contract between the company and the store owner whose location is used. The latter is paid for the service he renders, being given a commission on all the business originating at his telephone. The commission has no jurisdiction except in such cases where the community served, or any portion of it, may be deprived of telephone service by discontinuance of the instrument or failure to register it.

"Regardless of that, however, the company in this case is on the right track and will be upheld by the commission. Its action is proper and should be encouraged by all the public which pay the whole bill for telephones and which in the end pays for favors pay station owners secure or take to themselves.

"The complainants in the present case have used their telephones for incoming business, when it has been a part of the contract that such instruments were to be used only for outgoing business. Their alternative is to put in a private telephone at the regular subscription rate and take their place with all other business men who have to pay for their own telephones."

Maryland

The Chesapeake and Potomac Telephone Company has filed with the Public Service Commission a petition which discloses the fact that some of the company's subscribers who objected to the rates that were put into effect in 1912 not only have refused to pay the increases called for, but have failed even to pay anything at all for the service they have been receiving.

When the new rates were established there were a number of complaints. The commission, therefore, asked the company to continue supplying the objectors with service until the whole subject of telephone rates had been investigated. An agreement to comply with this request, it is claimed, has prevented the company from resorting to the ordinary and usual methods to enforce payment for service.

The result has been, the company alleges in its petition, that some of its subscribers who objected to the change in the rates have taken advantage of the situation and have been furnished service under conditions that discriminate against other subscribers.

The commission is now asked to rescind its order and to permit the company to collect the amounts due it by the usual methods, and also place it in a position to compel payment of its bills in the future.

Minnesota

Application has been filed by the Northwestern Telephone Exchange Company at Wadena, Minnesota, to change rates in effect at the present time as follows:

Individual line business	$2.00 per month.
Individual line residence	1.00 per month.

and to place in effect as of December 1, 1917, the following rates and classifications for telephone service to be furnished its subscribers and patrons at Wadena:

Individual line business	$2.50 per month.
Two-party line business	2.25 per month.
Individual line residence	1.50 per month.
Two-party line residence	1.25 per month.
Four-party line residence	1.00 per month.

A hearing in the matter is fixed to take place in the Commercial Club rooms at Wadena, Minnesota, on November 6, 1917, at 1:30 p. m.

Application has been filed by the Northwestern Telephone Exchange Company at Tracy, Minnesota, to change the rates now in effect for its exchange service as follows:

Individual line business	$2.50 per month.
Individual line residence	1.50 per month.

subject to a discount of 25 cents per month if paid at the office of the company on or before the 15th of the month in which the service is rendered.

The applicant desires to place in effect as of December 1, 1917, the following rates and classifications for telephone service at Tracy:

Individual line business	$2.75 per month
Two-party line business	2.50 per month.
Individual line residence	1.75 per month.
Two-party line residence	1.50 per month.

The above rates subject to a discount of 25 cents per month if the bill of the subscriber is paid at the office of the company on or before the 15th of the month in which the service is rendered.

A hearing is fixed to take place in the Commercial Club rooms at Tracy, Minnesota, on November 8, 1917, at 9 a. m.

Nebraska

The Chapman Telephone Company has been notified that it cannot justify giving its subscribers poor service because of the fact that the Central Power Company of Grand Island has paralleled some of its lines with high voltage electric wires. The lines of the latter company were put in a year or two ago without any protest from the Chapman company. Its manager estimates that an expenditure of 1,000 will be required to change the

grounded circuits to metallic. The commission suggests that if the Chapman company has been damaged it can obtain a remedy by bringing suit in the courts.

A circular letter was recently sent out to all telephone companies instructing them that the regular charge on business instruments must be made and collected of railroad companies for telephones in depots. Many cases had been reported where the railroads got free service under special contracts, or by offsetting the telephone rent by charging an equal amount for space occupied by the instrument or for answering calls.

The Dundy County Telephone Company of Benkelman has been authorized to increase its business rate from $3.50 to $4.50 a quarter and the residence rate from $2.35 to $3, but a proposed raise of $1 to $1.50 on farm lines has been denied. No dividends exceeding 7 per cent will be allowed out of the increased earnings.

The Cambridge Telephone Company cannot force subscribers to take stock in the company, according to a decision of the State Railway Commission.

Complaint against the Lincoln Telephone and Telegraph Company has been made to the Railway Commission by the Farmers' Independent Telephone Company of Red Cloud, alleging that the former has deprived it of toll line connections to Hastings, Superior and intermediate points, in violation of contracts made in 1910 and of an order by the commission in 1915 modifying these contracts. The Red Cloud company says it has 500 subscribers, while the Lincoln company has only 296 at that place. The patrons of the former depends on the long distance lines of the latter for toll connections, and up to October 1 they had access thereto, but on that date, says the complaint, these connections were severed and the Lincoln company now refuses to restore them. If this action is allowed to stand, the Red Cloud company declares that its subscribers will quit and go over to the Lincoln exchange in order to obtain toll service. It asks for an order re-establishing the toll connections as formerly maintained.

Ohio

The State Utilities Commission at Columbus Tuesday authorized the Cincinnati and Suburban Bell Telephone Company to issue $1,716,650 additional common capital stock to reimburse its treasury for improvements.

Committees from farmers and others and from the Chamber of Commerce of Galion attended a hearing before the Utilities Commission in Columbus relative to the proposed merger of the two exchanges in Galion.

Oklahoma

Campbell Russell of Oklahoma City, one of the three state corporation commissioners, heard the case of the Castle Telephone Company vs. the Okemah Telephone Company, wherein the Castle Telephone Company sought free service to Okemah for its patrons.

At one time Castle exchange enjoyed free service to Okemah, but the first of the year a toll fee of 10 cents was put on by the Okemah Telephone Company and to this fee the people of Castle, and the Castle Telephone Company objected. After hearing the evidence Mr. Russell held that the Okemah Telephone Company could not discriminate in favor of the Castle company, and after ordering the Okemah Telephone Company to establish a good line between the two towns, fixed the toll at 15 cents a message. The charge of 10 cents a message will be charged until the new line has been completed.

Oregon

Action was brought by the Coos & Curry Telephone Company for permission to revise rates and other charges for telephone service, and in effect replaces and consolidates various applications, formerly brought separately by the Coos & Curry Telephone Company and the Coquille Valley Telephone Company.

These applications were brought prior to a consolidation which since has been effected between the two companies and at a time when the applicants operated competitive exchanges in the city of Coquille. . After preliminary hearings in these matters, and at the solicitation of the commission, the systems of the two utilities were merged.

An amended application was presented wherein all claims for relief at this time are waived, except the increase in rates already sought covering exchange service for calls originating upon private farmer lines connected with the lines of the applicant at the limit of any city wherein the applicant maintains a telephone system or exchange, which claim is modified by a request for permision to charge 50 cents per telephone per month for such service connecting at the limits of the cities of Bandon, Marshfield and North Bend.

It is ordered that the Coos & Curry Telephone Company be granted permission to charge such rate for exchange service for calls originating upon private farmer lines connecting with the lines of the applicant at the limits of the cities of Bandon, Marshfield and North Bend, and that the company shall discontinue each and every conflicting charge and rate which may exist for that service, and this order shall become effective on the first day of November.

The valuation of the properties in Oregon for rate-making purposes of the Pacific Telephone and Telegraph Company is $12,429,507, according to an order of the Public Service Commission. This is a valuation of the properties actually used and useful for the convenience of the public, including a due allowance for working capital, stores and supplies, the valuation being as of December 21, 1916.

The valuation of the Portland properties is placed at $7,396,910, Salem properties coming next with a valuation of $306,819 and Eugene third with a valuation of $209,548.

The order finds that the company has installed additions and betterments in Oregon between June 30, 1914, and January 1, 1917, amounting to $755,228,69.

In stating the basis upon which it found the valuation of the company's properties for rate-making purposes as shown in the present order, the commission says:

"This value the commission conceives to be an expression in dollars of the foundation upon which the utility's claim for a return must rest and, upon the other hand, to represent the amount upon which, provided it requires the imposition of no rates in and of themselves unreasonable or unjust, the rate-payer should pay a reasonable return."

South Dakota

The contention of Mayor A. T. Hopkins, made on behalf of the city of Watertown, that the additional

charge for telephone rental of 25 cents included in statements sent out by the Dakota Central Telephone Company late last summer, is unjust and illegal has been upheld by the South Dakota Board of Railroad Commissioners whose decision prohibiting the telephone company from making the 25 cents charge has been issued. The order of the railroad commissioners restrains the telephone company from establishing the 25 cent charge and names the legal rental charges that may be made.

The order is as follows:

It is ordered, considered and adjudged:

That the original report of the board of arbitration, appointed by the parties to this proceeding, recommending and establishling a schedule of telephone rental rates for telephone service rendered by respondent at the city of Watertown be, and it hereby is, filed nunc pro tunc, as of April 30, 1914; and the rate filings and schedules of rates therein contained made by the respondent in the offices of the board of railroad commissioners of this state on February 17, 1917, and May 23, 1917, insofar as they are different form or conflict with the rates named in the said award be, and they hereby are, vacated, set aside and held for naught:

That until the further order of this board, the schedule of rates set forth in the report and award aforesaid, and as follows:

Main line business telephone a maximum rental of $3 a month.

Main line residence telephones, a maximum rental of $2 a month.

Main line, charitable institutions telephones, a maximum rental of $2 a month.

Extension telephones, a maximum rental of $1 a month.

Four-party line residence telephones, a maximum rental of $1.50 a month.

And no charges for collection or penalty shall be added to this maximum rate.

Be, and they hereby are, established as the legal and valid telephone rental rates of the Dakota Central Telephone Company for telephone service in the city of Watertown, nunc pro tunc, as of April 30, 1914.

The present rate filings of the respondent for additional and accessorial service at Watertown are approved, subject to investigation on complaint, or by this board on its initiative without complaint.

Pennsylvania

Thomas J. Landis, Pittsburgh, has filed complaint with the Public Service Commission against the Central District Telephone Company, alleging that the company does not maintain an adequate record of its business so far as it relates to the subscriber of limited contract. Accompanying the complaint is a long record of alleged faulty records and comparison in charges with the rates of other cities.

C. A. Sterling, a resident of the borough of Conneautville, the Crawford Mutual Telephone Company, in incorporated company, doing business in the western part of Crawford county, renders inadequate service, does not maintain its facilities in proper condition, does not employ sufficient operators, that its system is out of date and that its rates are discriminatory. The answer is a general denial of all the material averments made in the complaint.

The respondent operates over an extended territory in and about Conneautville borough, having about four hundred telephones on its lines. On its main lines it has in use metallic circuits, some of its smaller lines still using the grounded system. These, however, are gradually being displaced with metallic circuits. The respondent has a capital stock of $20,000, and a bonded indebtedness of $20,000 with interest at five per cent. A detailed statement of receipts and expenditures of the company filed with its answer, from April 1, 1913, to April 1, 1917, inclusive, shows gross receipts, including a loan of $400, of $24,597.82, and disbursements for the said period including an overdrarft of $345.16, of the same amount. No dividends were paid on the stock. In support of the complaint a large amount of testimony was taken which, however, was of a general character, most of it indefinite without specifying particular items of complaint.

Insofar as respondent's service is concerned, the testimony in support of the complaint was to the effect that the inadequate service generally occurred in the long-distance service or on account of the numerous telephones attached to a single line. Where such inadequate service was complained of in the long-distance service it was not shown or testified to that the cause thereof resulted from the deficient operation or facilities of the respondent company. The number of telephones attached to a party line in this case were not unusual for a rural company, and it is naturally incident to that character of service that there is more or less delay and annoyance caused to patrons. From all the evidence it would appear that the general service rendered by the respondent was adequate.

As to the facilities of the respondent, there was some evidence that in a few instances some of its lines or facilities were in need of repair, the respondent claiming this was due to the excessive hard storms which recently occurred in that vicinity, and that the necesasry repairs would be made at once. It was shown that the lines of respondent were in charge of a competent person and that upon any complaint being made, prompt attention is given thereto. We think that under all the evidence in this case the facilities of the respondent company are adequate and reasonably well maintained.

The charge that respondent company did not employ sufficient operators was not sustained. According to the evidence at the exchange maintained at Conneautville, three operators are employed who act from seven o'clock in the morning until nine-thirty at night, and during the night time a competent person is in charge of the exchange to answer all calls made thereon.

The complainant endeavored to sustain his complaint that the system of respondent is out of date by alleging that part of its system consists of ground return instead of metallic circuits. The evidence disclosed the fact that its main lines were all on metallic circuits, and that its less important lines operated on the ground system were being replaced. We do not think that the respondent, under all the evidence in this case, can or should be asked to replace all of its grounded lines at this time when the cost of material as well as labor is so excessive, nor that it can do so under the rates it is now receiving from its patrons. Should we require all metallic lines to be used, the respondent under its financial condition disclosed, would be compelled to increase its rates. It was necessary for the company a short time ago to make an increase in its rates and a schedule of such increased rates has been filed with the Commission. Much complaint was made on account of this increase. Should it be burdened with additional expense at this time a further increase might be necessary.

As to the discrimination alleged in regard to its rates, the evidence disclosed the fact that O. H. Wilder, one of the respondent's patrons, was securing his service for less than the scheduled rate. This was explained on the part of the company as occurring by reason of the fact that said patron supplied certain facilities to the respondent in addition to the payment of such reduced rental. The Commission is of the opinion that it would be better practice for the respondent to make a contract with this patron at its regular scheduled rates, and to arrange for facilities supplied by such patron by a separate contract so that its rates may all be uniform.

Complaint was also made that a certain telephone had been installed as a private phone at the reduced rate therefor, but was being used for business purposes and should therefore pay the higher rate. It appears that upon the respondent's attention being called to this fact it had ordered this to be corrected, and that the said phone will in the future be charged according to its schedule.

The respondent is a rural company so-called, and its schedule of rates is not higher than is usually charged by other rural companies operating under like conditions. It does not intend nor is it expected that its service will be of the same high order as is rendered by a company operating in a more restricted territory with a large number of subscribers and receiving higher rates. The service of respondent is equal to that usually rendered by rural companies. It is being managed in a reasonable economical manner. If it were called upon to make extended improvements it would necessarily be required to increase its rates to such an extent as to deprive many of its patrons of its service which they now have.

The minor matters complained of and testified to on behalf of complainant may be corrected without any order. That while the complainant has to some extent substantiated the matters complained of, the Commission does not feel constrained at this time to make any order in this case, opportunity being given to the respondent to make an inspection of its lines and make such changes as will correct the minor matters complained of insofar as they have been sustained by the evidence and the finances of the company will permit. Should any failure be made in this respect, the matter may be corrected by the Commission in the future.

Wisconsin

Members of the State Railroad Commission visited Racine October 24 to hear the complaints of patrons of the Wisconsin Telephone Company. The hearing was held in the council chambers, the commission having extended an invitation to all persons interested to be present.

The meeting of the commission in Racine was a result of a complaint filed by William Place, who alleged that the company's rates are unreasonable and that the service inadequate.

Officials of the telephone company admitted that the service during certain hours of the day is inadequate, due to the very heavy load the exchange board is forced to carry, but that every effort is being made to relieve the situation and that the service will be grealty improved when the new exchange building is completed.

Utah

A complete schedule of tariffs was filed with the State Public Utilities Commission by the Mountain States Telephone and Telegraph Company. An accompanying letter says that the tariffs given as being in effect at Milford are not as yet in force and will not be until the new exchange building there shall have been completed. At that point the business rate is to be increased from $36 to $42 per year, and that the new two-party line traiff will be $36 annually.

The Mountain States Telephone and Telegraph Company has the right to change the numbers and the prefixes assigned to its patrons in the telephone directory as may seem to it necessary and best in accord with rendering efficient service to the public as a whole. Such is the gist of a decision rendered by the Public Utilities Commission of Utah.

The decision comes in the case of Citizens Coal Company, the Federal Coal Company and the Central Coal & Coke Company against the telephone company. The complaint alleged that the changing of the prefixes and the numbers of their telephones was causing them great and irreparable damage, and also that discrimination had been used in changing the numbers of some of the companies, while those of their competitors were not changed. Customers had become accustomed to the old numbers of the companies and considerable expense had been entailed in advertising those numbers, all of which would now be lost, according to the complaint.

The decision, after discussing the question of whether changes of which complaint is made were covered in the rules and regulations of the company, and of whether due notice of those rules and regulations had been given to the coal companies, goes on to take up the question of whether the contract as referred to is one that should be observed as being necessary and reasonable and not against public policy. It is held:

> The changes no doubt occasioned some inconvenience to the plaintiffs, as well as some expense in the changing of said numbers on advertising matter. Such inconvenience and expense should be allowed only when it appears to be reasonable and necessary and in keeping with the rules, regulations, notices and contracts under which service is rendered to the patrons of defendant company.....
>
> If the telephone company is required to give service that is reasonable and efficient, it should be allowed in giving such service a reasonable latitude to adopt and enforce such regulations that will permit it to render such expected and required service. Should any other rule than this be promulgated by the courts and by the commission, then it would be vain under all conditions and circumstances, to expect a corporation to render reasonable and efficient service to the general public.
>
> We are of the opinion that under the showing there was a reasonable necessity, in the interest of public service, for making the changes complained of.
>
> As to the question of discrimination, raised in the complaint of the plaintiffs, it would appear that the plaintiffs do not strongly contend, or at all, that the showing was sufficient to prove actual discrimination.

National Association of Commissions

At a meeting held at the Interstate Commerce Commission the National Association of Railway and Utilities Commissioners elected the following officers for 1917-18:

President, Edward C. Niles, New Hampshire; first vice-president, Charles E. Elmquist, Minnesota; second vice-president, C. M. Candler, Georgia; secretary, James B. Walker, secretary of the Public Service Commission, first district, New York; assistant secretary, Leroy S. Boyd, librarian, Interstate Commerce Commission.

Executive committee: C. M. Chandler, Georgia, chairman; S. C. McChord, of the Interstate Commerce Commission; James C. Carr, New York; Alonzo R. Weed, Massachusetts; P. W. Dougherty, South Dakota; Edward C. Niles (exofficio), New Hampshire; and James B. Walker (exofficio), New York.

President Niles announced the appointment of the special war committee created by the convention as follows:

Max Thelen, California, chairman; Frank H. Funk, Illinois; Travis H. Whitney, New York; Joseph B. Eastman, Massachusetts; Ralph W. E. Donges, New Jersey; and Edward C. Niles (exofficio), New Hampshire.

The association voted to hold its next meeting in Washington on November 12, 1918.

Meeting at Marshfield, Wis.

The Wisconsin Telephone Association known as Group Seven met in Marshfield October 17 and was represented by more than twenty exchanges in Wood, Clark and Marathon counties. Secretary Pratt of the state association presided at the meeting.

The most important matter acted upon was engaging the services of John F. O'Connell to act as expert accountant. It will be his duty to establish a uniform system of bookkeeping in the exchanges included in the group, a matter which at the present is causing much trouble and unnecessary expense. Mr. O'Connell for a number of years past has been associated with the State Railroad Commission as expert accountant and is therefore a valuable man. Other matters pertaining to the telephone business were also discussed.

Sounds Like the Old Days

A. W. Wright, who told Mayor Taylor of Little Rock, Ark., that he was a newspaper man and an electrician, called on the mayor to ascertain what encouragement he would receive from the city council if he should ask for a franchise for an independent telephone company in Little Rock. Mr. Wright said that he had some millionaires behind him of Memphis and Dallas, Texas, but was unwilling to give their names. He was informed by the mayor that if he asks the city council for a franchise his petition would be considered, if presented in proper form and if the proposition had sufficient backing to warrant consideration.

Of Interest to the Trade

What the Telephone and Accessory Manufacturers Are Doing to Advance the Art

Instant Transmitter Repairs

If standard transmitters cost only a trifle, and were not much bigger than a thimble, every repair man could carry a few in his pocket. Then when a subscriber's instrument refused to talk for reasons unknown to the subscriber, and the repair man's ten mile trip disclosed a faulty transmitter, he could take a new one out of his pocket, screw it into place, and be on his way. At present, not carrying a supply of new transmitters with him, he has to hold the repair up for a second trip. Few telephone repair men can restore a balky transmitter to perfect order on the premises of the subscriber.

J. Skinderviken, president and general manager of the Standard Telephone Repair Company, has so nearly approximated this desirable condition that he leaves little to be desired in the way of transmitter repairs. He has applied for patent on a self-contained transmitter button which meets practically all the conditions of our first paragraph. Externally the button is merely a cone-shaped bit of brass with a threaded stem, a nut and a lock-nut to fit the hole in the standard transmitter diaphragm.

The whole device is, as we said, little larger than a thimble. It sells for less than a dollar. It is applicable to all makes of transmitters in use in this country.

And it has at least one paramount advantage over the regular transmitter. It talks equally well in all positions —vertical, horizontal, inverted, or at any angle.

The method of repair used with the Skinderviken button is to remove with a small screw-driver the metal bridge common to all standard transmitters. This bridge the repair man puts in his pocket, to be referred later to the exchange scrap heap. The button then is screwed directly to the transmitter diaphragm, without any support but its own screw stem. The whole repair can be execued in little more than a minute.

The exchange manager will need no more explanation than this to convince him of the desirability of the new system of transmitter repair about to be introduced by Mr. Skinderviken. The increased service and satisfaction of the subscriber when his inert transmitter is instantly repaired at the telephone man's first call, and the ability of the repaired transmitter to talk in any position, are unusual virtues to repose in so small a device.

This universal position feature makes the Skinderviken button very useful also in repairing hand-microphones, which are commonly subjected to the most severe distortions of position. The same is true to a lesser extent of the regular desk stand.

Further announcement and explanation of the new transmitter button will be made in a subsequent issue.

Freight-Saving Wrinkles

"Think ahead and order early" is the slogan of a large wholesale grocery house, which endeavors to save freight facilities by more systematic arrangement of orders from its customers.

New Orleans draymen are co-operating with railroads, steamships, and merchants to speed up freight and shipments. A central bureau has been established to handle such details as the surrendering of bills of lading, releasing warehouse receipts, guaranteeing or paying storage charges, putting shipments in good order, and standardizing shipping arrangements. One of the objects of this bureau is to bring about the adoption of a uniform delivery and receiving rule.

A New Orleans traffic manager says that the man who must now be reached in the freight-saving campaign is the small miscellaneous shipper. "But I doubt," he adds, "whether full co-operation in the matter of quick loading, prompt unloading, and heavy loading of cars can be obtained by simply asking him to do it. I doubt the wisdom of asking him 'to do something for the railroads.' The more effective way to reach him is to show him actual figures on the increased efficiency of the carriers and, if possible, that the larger shippers are not doing business through any particular favoritism, but rather through their full co-operation with the carriers and their increased efficiency in car handling."

Acting on a suggestion of the Railroads' War Board, officials of eastern roads will keep a record of all aid given the roads by shippers. These will be filed as war-time data of specific acts of shippers, or passengers, employees and public officials, and others contributing definitely to greater service. The suggestion came from President Loree, of the Delaware & Hudson, who is chairman of the eastern division of the Railroads' War Board.

Large P. A. X. Installations

Some of the largest producers in the world have installed private automatic exchanges, not only for handling intercommunicating telephone traffic of the company, but also for direct connection with city and long distance facilities. Some of these great institutions are "Goodyear Tire & Rubber Co., Akron, O.; National Cash Register Co., Dayton, O.; Dodge Bros., Detroit, Mich.; Remington-Arms Co., Bridgeport, Conn.; National Tube Co., McKeesport, Pa.; Republic Iron & Steel Co., Youngstown, O.; Grasseli Chemical Co., Cleveland, O.; Standard Oil Co., Cleveland, O.

A great many mercantile establishments of national prominence also have this newer system for telephone communication, including Sears-Roebuck & Co., Montgomery-Ward & Co., National Suit & Cloak Co., Armour Company, Swift & Company, The Simmons Hardware Co., St. Louis; Great Atlantic & Pacific Tea Co., and The United Fruit Co., New York City. Some of these establishments have more than 1,000 telephones in use, connections being made by an automatic switchboard unattended by any operators.

The Du Pont Company of Wilmington Del., has just issued a very interesting booklet entitled "The Giant Laborer." It points out and proves the advantage of using Du Pont explosives for various agricultural and miscellaneous uses. It explains what ebenefit explosives have been in land clearing, ditching, drainage, subsoiling, tree planting, orchard cultivation and other uses. It is a companion or sequel to "Handbook of Explosives," another recent booklet, and latter book containing full instructions as to "how" to handle and use explosives. Both books will be sent on application to the company.

149th U. S. Field Artillery Kellogg Equipped

While infantry troops are indispensable it is the artillery that is the great factor in the present struggle. A greater proportion of this arm to other troops than ever before used is now on the firing line, with a marvelous system of placing their fire just where and when it should be.

The 149th Artillery, our own former First Illinois artillery, is going to be a part of this irresistable, advancing force. They are at Camp Logan now.

Modern artillery must have reliable, comprehensive and adaptable telephone equipment behind it.

In addition to the many thousand field sets the Kellogg Company takes special pride in the complete portable switchboard equipment furnished the 149th Field Artillery.

Putting Through a Call for Orders

How the 149th Feel About Kellogg

These little boards range in capacity from five to fifteen lines each. Being made very compact and comparatively light, they are easily handled, and can be mounted almost anywhere without any trouble.

They are equipped with standard Kellogg apparatus throughout, and will give the highest grade service in the severe service conditions under which they will operate.

Field artillery must be ready to move at a moment's notice, which means that the telephone equipment must be dismantled, moved and reconnected in a very short space of time.

Artilley fire is directed mainly by men who figure the range for the gunners. They may be located two miles back of the firing line and receive their information from the men in the "look-outs," aeroplanes, etc.

They are equipped with the fifteen line switchboards, having connection with the commanding officers as well as the artillerymen.

If any of the guns are shooting beyond or short of the object, they telephone the gunners the correct position for their pieces.

The firing line is equipped with the five line switchboards, which are connected with the fifteen line boards just mentioned.

Two men are placed at each switchboard, one man operating the board while the other takes or gives the messages received or sent.

Reporting Change of Range with Fifteen Line Board. Tied to a Tree Trunk in a Jiffy

A Long Service Set in the Quartermaster's Tent

The Kellogg standard test set is used as operator's set with these boards, also furnishing the ringing power. Being compact and light they are easily handled.

These standard test sets are also used by men in the outposts, etc., enabling them to give instant reports. They can be connected at any place. Wherever possible barbed wire fences are used as telephone wires.

One of the accompanying pictures taken in the quartermaster's tents shows an old type Kellogg telephone mounted in the center.

They have six of these sets which have been in continual use for years and are giving the best of service today. The artillerymen say they would not be without these Kellogg telephones.

In describing this portable telephone system it is of

interest to note that these switchboards are an excellent example of Kellogg immediate service. From the time of their ordering and designing but one week elapsed before their delivery complete.

The complete equipment consisted of eleven fifteen-

Waiting for a Call

Observation Post Reporting. Lieutenant Royer and Sergeant Heisch. Test Set Also Convenient for Trench Work

line and nine five-line switchboards and sixty-five special test sets.

The Du Pont Products

There has just been issued a handy little booklet which contains a list of all the products manufactured by the E. I. du Pont de Nemours and associated companies, namely Du Pont Chemical Works, Du Pont Fabrikoid Company, The Arlington Company and Harrisons, Inc. Of course this booklet does not indicate who uses the products or how used, as does the Du Pont Products Book, but it will no doubt prove of interest as well as of value to many mercantile and industrial men. It will be sent upon application to the home office at Wilmington, Del.

Dept. of Agriculture Installs Stromberg-Inter-Comm-Phone System

The States Relations Service of the Department of Agriculture recently placed an order with the Stromberg-Carlson Telephone Manufacturing Company of Rochester, N. Y., for a complete 32-station intercommunicating telephone system for installation in the new offices of the department.

All of the telephones are to be of the combination type with separate key boxes containing the 32 switching keys. This type of telephone is particularly useful for office service as it is usually mounted on the side of the user's desk where it is never in the way, yet always handy for instant service. The transmission efficiency of telephones of this type is unusually high because the transmitter is held directly in front of the user's lips while talking.

During the past three or four years nearly all of the larger divisions of the Department of Agriculture have been equipped with Stromberg-Carlson Inter-Comm-Phone systems.

Letter Postage Increase

INCREASE IN DOMESTIC RATES OF POSTAGE ON FIRST-CLASS MATTER INCLUDING POSTAL AND POST CARDS

The following increases in rates of postage, according to Postmaster General's Order No. 755, dated October 3, 1917, become effective November 2, 1917:

Upon all matter of the first-class postage shall be charged at the rate of three cents for each ounce or fraction thereof; and drop letters shall be mailed at the rate of two cents per ounce or fraction thereof, including delivery at letter-carrier offices.

(A drop letter is one addressed for delivery from the office at which it is posted. There is no drop rate on any matter except letters.)

Postal cards shall be transmitted through the mails at a postage charge of two cents each, including the cost of manufacture.

It shall be lawful to transmit by mail, at the postage rate of two cents apiece, payable by stamps to be affixed by the sender, and under such regulations as the Postmaster General may prescribe, written messages on private mailing cards, such cards to be sent openly in the mails, to be no larger than the size fixed by the Convention of the Universal Postal Union, and to be approximately of the same form, quality and weight as the stamped postal card now in general use in the United States.

POSTAGE RATES ON LETTERS TO CERTAIN FOREIGN COUNTRIES

Pursuant to the above order of the Postmaster General, the letter rate of postage provided for therein will, on and after November 2, 1917, be applicable to letters addressed for delivery in all those countries to which up to that date such mail was transmissible at the rate of two cents an ounce or fraction of an ounce.

To all other foreign countries, the International Postal Union rate on letters of five cents for the first ounce or fraction and three cents for each additional ounce or fraction of an ounce, continues unchanged under the Revenue Act.

Modernizing an Exchange

The multiple switchboard of the Vandergrift Telephone Company at Vandergrift, Pa., is to be remodeled by the Stromberg-Carlson Telephone Manufacturing Company.

Among the many improvements called for in the contract, which was recently signed, are: Automatic four-party harmonic machine ringing; automatic listening; automatic flashing recall; emergency listening by means of individual cam key and automatic peg count.

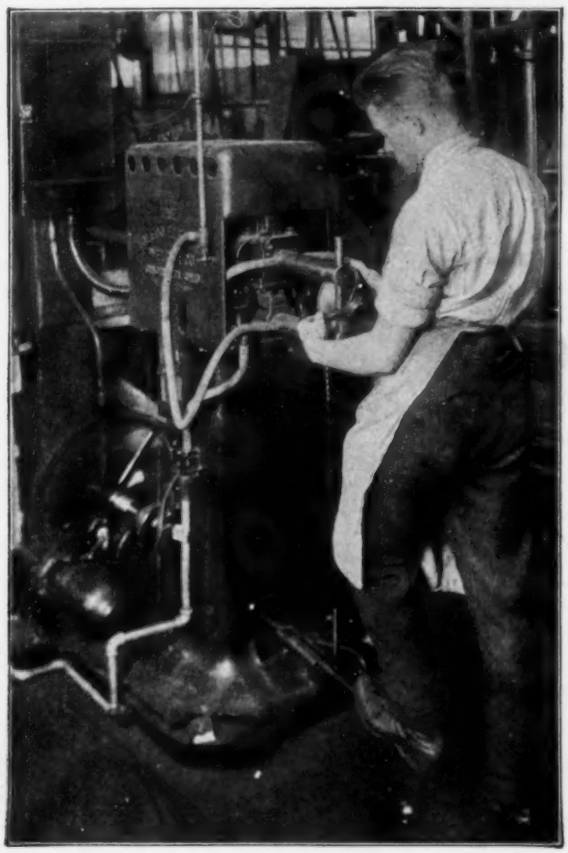
Officials of the Vandergrift Telephone Company are confident that the added improvements will enable them not only to give the fastest and most efficient service to their subscribers but also to economize in the maintenance and cost of their plant.

Welding Metal Telephone Parts

Manufacturing experts in the Stromberg-Carlson Telephone Manufacturing Company's factory at Rochester, N. Y., are constantly looking for new ways to improve the quality of the company's products. New and improved machinery of all kinds is carefully investigated to determine its utility in the manufacturing of telephones and their associated parts.

The accompany illustration shows an electric spot welding equipment in the machine department which takes the place of punch and rivet operations on sheet metal parts and does the work much faster and better.

In joining two pieces of metal together the work is placed in proper position between two copper electrodes and the welding current sent through the work at a po-



Stromberg-Carlson's Spot-Welding Machine for Sheet Metal Parts

tential of 3 to 5 volts. The current is very heavy and its value depends upon the nature of the work and the thickness of the parts. In a fraction of a second the resistance of the metal in the parts between the clamped electrodes causes the generation of an intense heat at the point of contact which so softens the metal that the separate pieces are made to unite in a weld at that spot under the pressure of the electrodes. Upon removing the pressure from the electrodes the two pieces are found to be welded at the point of contact and the joint is, of course, stronger than a riveted joint and much neater in appearance.

The machine is equipped with its own motor generator set which transforms the current from the factory power mains to a suitable voltage and amperage for welding purposes.

Telephone men are cordially invited to stop off at Rochester and take a trip through the big 15-acre plant of the Stromberg-Carlson Company. The many interesting processes used there are well worth investigation.

The Trade Press Helps

"It is a great satisfaction to me to be able to say that the press of the country has been within recent months helping the railroads most generously and effectively."

This statement was made at the convention in Chicago, October 12, of Associated Business Papers by R. H. Aishton, president of the Chicago & Northwestern Railway and chairman of the Central Department of the Railroads' War Board.

"The only possible solution of the problem with which the railways were confronted when this country entered the war," continued Mr. Aishton, "was to increase the amount of service they could get out of every mile of track, every engine and every car.

"In order to get more service out of each car they had to secure the co-operation of shippers in loading and unloading cars more promptly and in loading them more heavily. To save men and fuel for freight service they had to make reductions in passenger service which, up to the present time, amount to 25,000,000 passenger train miles a year.

"In order to secure the good will and co-operation of the public in doing these things the railroads had to get before the public the reasons why they had to be done. To get this information to the public the railways recently have sent to the press a large amount of material showing the problem with which they were confronted and the means they were using and must use to solve it. The railways and the nation owe a debt of gratitude to the press for the generous way in which it has told and commended what the railways have accomplished.

"There remains, however, a great deal more which the press can do to help the railways in their effort to help the nation to win the war. If the demands now being made upon the railways by military and commercial traffic should continue as heavy as they now are, or even increase for some time as it now seems probable they will, the task of the railways is going to grow more and more difficult.

"The railways are working every locomotive and car and track to the utmost now. Shortage of labor and material make it extremely difficult to maintain adequately our present equipment, while it is practically impossible to get new equipment. It is almost impossible to get rails and other track materials to replace those being worn out.

"You will readily see what all these things mean. They mean that if the war goes on it is going to become more and more difficult for the railways to meet satisfactorily the demands on them. If this is the case the railways will need the help of the press more and more. They will need it in presenting the facts about railway conditions to the public, in urging the public to co-operate with the railroads in all the ways that it can and also in urging the public to be tolerant regarding any delays and inconveniences to which it may be subjected.

"I do not suggest that you gentlemen of the business press should do this for the benefit of the railways, for I know you are not specially concerned with the welfare of the railways. But you are specially concerned regarding

the welfare of the great industries with which you are identified, and you are more vitally concerned for the welfare of your country.

"One of the most effective ways in which you can serve those industries and your country in this great emergency is by using your powerful influence to get the business interests to co-operate with the managements of the railways in every way they can so as to enable the railways to handle the unprecedented traffic which is now moving and which, so far as we can see ahead, will continue to move for months to come."

Reducing Battery Cost

The prices of dry batteries have been and still are going upward, and they no doubt will for some time to come. This makes it necessary to get all the possible current out of dry batteries.

On magneto party lines, considerable battery current is unnecessarily used by subscribers in listening to weather and grain reports, etc. This loss, at first thought, does not seem to be great, but the result of most careful investigations and tests on existing rural lines throughout the country is said to prove an annual loss from batteries wasted by "listening" of more than a quarter of a million dollars.

The Battery Saver Booklet.

The loss of current from 20 listening telephones is not less than 8.4 watts, and as this energy comes from dry batteries, the loss is equivalent to burning about three 25-watt Mazda lamps on ten-cent current. If any telephone manager should discover even three 110-volt lamps burning unnecessarily in broad daylight, he would not only turn them off before doing anything else, but would doubtless endeavor to locate the person responsible for such unnecessary waste, and caution him to avoid its happening again.

The accompanying illustration is a reproduction of a booklet issued by the Kellogg Swithboard and Supply Company on battery savers. The Kellogg battery saver, as a long-needed remedy for the wasting of battery current, has proven remarkably successful wherever used.

This battery saver is a simple device which does not interfere with the wiring of the telephone in any way, operating purely mechanically. Removing the receiver releases the hookswitch which is retarded by the battery saver in a position permitting connection of the listening circuit. This permits listening-in without using any of the battery current.

When desiring to talk, all that is necessary is to touch the battery saver which releases the hookswitch and permits the connection of the talking circuit. Upon returning the receiver to the hook, the battery saver returns to its original position.

The battery saver not only saves the battery current, but also improves the service, as a practice of allowing transmitters to be "live" when a number of parties are merely listening, often produces so much foreign noise on the line that it becomes impossible to understand, even though the talking party's battery be in good condition.

The Kellogg Company advises all rural companies to equip their telephones with battery savers, as the expense is so trivial and the economy and service benefit so great.

Examination for Radio Inspector

The United States Civil Service Commission has announced an open competitive examination for the position of radio inspector to be held on November 7, 1917. A roll of men will be prepared from this examination to fill vacancies that may occur in the positions of radio inspector and assistant radio inspector in the service of the Bureau of Navigation. Entrance salaries range from $1,200 to $1,600 a year, depending on qualifications of the appointee. Applicants must have received a bachelor of science degree from a school of recognized standing, such educational training to have included a special course in radio or kindred sciences, or show that they are senior students in such institutions, or that they have had the equivalent of a high school education and in addition not less than two years' experience in special radio work, such as the manufacture, installation or adjustment of commercial or governmental wireless apparatus. It is desirable but not essential that they be wireless telegraph operators. Applicants must have reached their twentieth birthday on the date of the examination. They should apply for Form 1312, stating the title of the examination desired, to the Civil Service Commission, Washington, D. C., or to the secretary of the United States Civil Service Board at any place in the various states.

Illinois Wants Railroad Engineer

The Illinois State Civil Service Commission will hold an unassembled original entrance examination to provide an eligible list for the position of railroad engineer for the Illinois Public Utilities Commission. There is one position to be filled now at Springfield, salary $250 to $333.33 a month, open to male citizens of the United States over 25 years old. The duties are:

Entire charge of the investigation of railroad accidents, examination of dangerous crossings, inspection for approval of interlocking plants and signal circuits, investigation of railroad service complaints, and preparation of orders in connection with railroads.

Applications must be on file in Springfield before 5 p. m., Thursday, November 22, 1917. No application blanks will be mailed after Monday, November 19, 1917. The proper application forms may be secured by addressing the State Civil Service Commission at Springfield, Illinois.

An attractive little booklet on "Standard Desk Telephones" is issued by the Stromberg-Carlson Telephone Manufacturing Company. Every page carries a halftone illustration pertaining to its text.

A folder from the Frank B. Cook Company tells all about the Cook multiple lightning arrester No. 5, with illustrations and prices.

Constitutional Amendment Up

Below is printed the resolution which the Paducah, Kentucky, Board of Trade has adopted indorsing the Constitutional Amendment, which authorizes the consolidation of the dual telephone systems of Kentucky in order to do away with conditions of telephone service such as exist in Paducah and other cities of the state. The amendment will be submitted to the voters in the coming November election. It is as follows:

Whereas, The General Assembly, at its 1916 session, adopted a Constitutional Amendment to be submitted to the voters of the state for ratification at the November, 1917, election, under the terms of which, with the approval of the state authorities and the City Commissioners of the city in which the telephone companies are located, one telephone company may purchase the lines of another, therefore, be it

Resolved, That the Paducah Board of Trade endorse the adoption of the Constitutional Amendment and urge the voters of Paducah, McCracken county, and the state at large to vote for the amendment at the ensuing November election, we also urge all the other commercial bodies in Paducah and Western Kentucky to lend their assistance by adopting similar resolutions and taking whatever other action they may deem necessary to get the voter acquainted with this amendment, and be it further

Resolved, That the president of the Paducah Board of Trade be authorized to appoint a committee to bring this to the attention of the other commercial bodies in Paducah, and aid in whatever manner it can in bringing to the attention of the voters at large.

Target Ranges Get Telephones

Telephone equipment now is being arranged by the Department Signal Office, under direction of Major A. T. Clifton, for the target ranges at each of the big National Guard camps and National Army cantonments that have been established in the Southern Department.

These ranges will be for Camp Travis at Leon Springs; at Camp MacArthur, Waco; at Camp Bowie, Fort Worth; at Camp Doniphan, Fort Sill; at Camp Cody, Deming, N. M., and at Camp Logan, Houston.

The work of equipping the target ranges with telephone connections at the various firing distances will be pushed as rapidly as material is obtainable.

The length of time that will be required is not known, as it is uncertain when all material can be had.

Capital stock of the Chicago Telephone Company has been listed on the Chicago Stock Exchange. The telephone company has outstanding $6,000,000 of its stock out of an authorized issue of $10,000,000.

Success

"Invariable success isn't the best thing for anybody. Sometimes it may be a matter of luck—and you don't know it. You think you have succeeded because of your methods; whereas you may have succeeded in spite of your methods. If you had failed you would have known your methods were wrong.

"I wonder how far I should have gone if I had always stopped to ask myself timidly whether I could make good on a particular job. I believe that most of the men who are standing still in their work are doing so because they are moral cowards to the extent of being afraid of failure.

"The chances are that a man with the courage to try, and the will to succeed, won't fail. If he does, at least he has got his teeth into something! If there's any bull dog in him, he won't let go of what he has tackled, just because it has fought back. I believe it is better to try and to fail than not to try at all."—Oliver Morosco.

Illinois Court Allows Sale

Subscribers of the Central Union Telephone Company at Riddle-Hill, Illinois, lost their appeal from the ruling of the State Public Utilities Commission when Judge E. S. Smith in the circuit court affirmed the decision permitting the telephone company to close its Riddle Hill exchange, and sell its properties in that vicinity to the Boynton Telephone Company, and the Union Telephone Company at Chatham.

There are 198 subscribers connected with the Riddle Hill exchange. They practically all appealed to the circuit court from the Utilities commission ruling, depriving them of a Central Union exchange. They will now be divided among the three exchanges; ninety-eight will be connected with the Springfield office of the Central Union; sixty-three will be taken over by the Boynton Telephone Company, and twenty-eight will be absorbed by the Union Telephone Company of Chatham.

As a concession to Americans, English may now be spoken over the telephone in Paris. This will also save the wear on the instrument that would be caused by the American effort to talk French.

"Safety Panels and Cabinets" is the title of the Crouse-Hinds Company's Bulletin No. 1D. It gives full information on the subject indicated is given.

Brevities of the Business

The Activities of the Whole Telephone Field Told in Short Paragraphs

PERSONAL NOTES

J. J. Carty, chief engineer of the American Telephone and Telegraph Company, and lately appointed senior major of the Signal Reserve Corps, has been appointed by President Wilson a colonel in the Signal Corps in the regular army of the United States, to rank as such from August 15

A. C. Brehm of Germantown, Ohio, has been employed as manager of the Lewisburg Telephone Company, to succeed Everett Wysong, who resigned the position there to become manager of the Eaton Telephone Company.

Dr. Moses G. Parker, a director and member of the executive committee of the New England Telephone and Telegraph Company since its organization, died suddenly at his home in Lowell, Mass. He was 74 years old and was born in Dracut. Dr. Parker was formerly president general of the National Society of Sons of the American Revolution and was prominent in other historical organizations. He made a special study of electricity and was said to be the first to photograph the electric current and show that it takes the form of spirals.

F. V. Newman, secretary and treasurer of the Michigan Independent Telephone and Traffic Association, has resigned that position, and became assistant to President William Fortune of the Indianapolis Automatic Telephone Company, removing from Grand Rapids. His successor has not yet been chosen. The position which Mr. Newman leaves is called among telephone men the graduating position. W. S. Vivian, his predecessor, left that position to become secretary of the national organization of the Independent telephone companies, with headquarters in Chicago.

G. T. Sprecher, thirty-two years in the service of the Nebraska Telephone Company, and over twenty years commercial manager of the Norfolk district, has severed his connections with the company to accept a position with the Lincoln Telephone and Telegraph Company, at Lincoln, Neb.

J. W. Ramey, manager of the Lincoln, Nebraska, Telephone and Telegraph Company, met death at a cross roads three miles northwest of York, Neb., on October 13. Ramey was returning from a trip in the country, and as he approached the cross road, Edward Green of Seward was returning from Polk. Ramey's left front wheel caught the left hind wheel of Green's automobile, smashing both wheels and turning Ramey's car over, breaking his neck.

Captain John A. Kick, who for several months has been in the Chicago branch of the headquarters staff of the chief signal office for the central war department, under Lieutenant-Colonel L. D. Wildman, is now at Camp Lewis, American Lake, Wash., with the 91st division, 405th telegraph battalion.

George Vasmer, consulting counsel and former general counsel of the American Telephone and Telegraph Company, died at Boston, October 18. He was about 72 years of age and became identified with the Bell company in 1886, first as official attorney and then as counsel and later general counsel.

Harry R. Allensworth, valuation engineer, is now associated with the Tri-State Telephone Company, and will supervise the valuation of all Tri-State toll lines now under way by order of the state railroad and warehouse commission. Mr. Allensworth is a member of the American Institute of Electrical Engineers and was formerly city electrician, Columbus, O. He recently completed a valuation and rate study for the Interurban Electric Railway in Central Ohio.

Frank E. Bohn, president of the Indiana Independent Telephone Association and secretary and general manager of the Home Telephone and Telegraph Company, of Fort Wayne, Ind., was named on the Indiana Liberty Loan Committee of Public Utilities. In line with this work Mr. Bohn has mailed to all telephone companies in the state copies of the request for this great co-operative movement to acquaint everyone with the need for the funds and details of the loan plans.

H. T. Dabney, who has been the efficient and popular local manager of the Cumberland Telephone and Telegraph Company, has been promoted to superintendent at Shawneetown, Ill.

Manager J. K. Stitt, of a local plant of the Central District Telephone Company in Ohio, who has been with the company 37 years, announced his promotion to the managership of the Oil City, Pa., office, where he will also be in charge of the plants at Titusville and Franklin. The manager there goes to Sharon.

J. A. Murray is the new local manager for the Pacific Telephone and Telegraph Company at Pendleton, Ore. He will relieve D. J. Butcher, special representative of the company, who has been filling the position temporarily. For several years Mr. Muray was manager of the company at Eugene. He left there to take up special work in which he has been engaged out of Portland for the last two years. He has had years of experience in the telephone business and understands it in all its many phases. This morning he took up his new duties.

President Francis H. Dewey of Worcester, Mass., Consolidated Street Railway Company, a director of the New England Telephone and Telegraph Company, was elected a member of its executive committee. Mr. Dewey, who is the only Worcester member of the board, has been a director 11 years.

Charles H. Button, formerly secretary, treasurer and general manager of the Lebanon, Oregon, Mutual Telephone Company, has purchased the interest of A. M. Robertson in the Lindsay, California, Home Telephone and Telegraph Company.

Roy Rogers, formerly the Lincoln Telephone and Telegraph Company assistant wire chief, at York, Neb., is now manager of the Friend exchange.

W. J. McQuiston, for 15 years manager of the Monmouth, Ill., Telephone Company, has resigned. He is succeeded by Fred Norris.

John Christensen has been elected manager of the Blair, Nebraska, Telephone Company, succeeding Stanley D. Gossard, resigned.

Wendell Hays has been made manager of the Eldora Mutual Telephone Company, at Eldora, Iowa.

Lon Dunn of Milo, Iowa, has purchased the Marengo, Iowa, Telephone Company, and will make a number of improvements.

Jerome Neal, lineman and troubleshooter for the Gulf States Telephone Company, at Hamilton, Texas, has been made local manager at Kosse.

Frank Crawford has sold the Wellington (Texas) Telephone Exchange to O. L. Fink of Nebraska.

R. E. Dutcher, who recently sold the Pierce (Nebraska) Telephone Company to E. C. Hunt of Malmo, has purchased the Plainview Telephone Company. He has applied for permission to rebuild the lines of the company and to increase the rates.

C. B. Kennedy, president of the Canton Cooperative Telephone Company, Canton, S. D., died recently at his home in Canton after a short illness. He was at one time president of the South Dakota Independent Telephone Association and has featured prominently at all of its annual conventions, acting as master of ceremonies at many of the banquets.

Joseph Abrams, manager of the Dorchester, Nebraska, exchange of the Lincoln Telephone and Telegraph Company, has joined the United States Signal Corps Reserve.

H. L. Crouse, manager of the Benedict, Nebraska, exchange of the Lincoln Telephone and Telegraph Company, has entered the national army.

C. L. Walker has been made district inspector for the southern plant department of the Lincoln Telephone and Telegraph Company.

J. B. Alexander is now manager of the Texas Telephone Company, at Ennis, Tex.

Mathias Klein, president and founder of the firm of Mathias Klein & Sons, Chicago, celebrated his 91st birthday anniversary September 20.

* * *

NEWS FROM THE FIELD

CALIFORNIA

The Pacific States Telephone and Telegraph Company is completing its new circuit between Quincy and Reno, consisting of four main lines and two local wires. The new line is much shorter. Clio, Mohawk and Johnsville will be on local circuits.

The Asher Electrical Company of San Francisco received the contract to install electrical equipment consisting of telephone poles and transmission lines, at Angel Island.

Plans are now being made by the Pacific Telephone and Telegraph Company for the construction of a new line between Oakdale and Modesto. The new line will handle toll business.

J. Downey Company of San Francisco has been awarded the contract for the construction of the Sunset Telephone building, to be erected in Glendale.

The Western Union Telegraph Company has taken over the telegraphic service along the line of the Tonopah and Tidewater railroad. The service now reaches beyond Ludlow to Death Valley Junction, Silver Lake, Tecop and Zazriskie, Cal., and further connections to Ryan, Riggs, Shoshone, Acme, Cal., and Pahrump, Nev.

The Pacific Telephone and Telegraph Company will spend $59,920 for an additional phantom circuit between Sacramento and Stockton, for additional equipment in the central office, for an improvement in the service between Stockton and Fresno, and for new toll circuits at Various points in the Stockton-Fresno division.

To improve service in Southern California, the Pacific Telephone and Telegraph Company has set aside $200,000 for purchase of additional equipment and improvement of its present pahaphernalia. Principal improvements are as follows: Glendale, central office, $77,410; copper circuit between Campo and El Centro, $38,020; copper circuit between San Diego and Campbell, $30,080; trunk cables between Ocean Beach and San Diego, $15,090; various improvements at Orange, $9,200; pole lines between Los Angeles, Whittier and Artesia, $9,240; rerouting line between Redondo and Redondo Junction, $7,150; construction work in Ocean Beach, $3,880; poles and cables at Orange, $1,430; remodeling plant at Ocean Beach, $2,360; construction work, Kern County line to Bakersfield, $2,440; circuits between Torrance and Los Angeles, $2,110; cable work at Brawley, $670; magneto switchboard at Calexico, $570.

ILLINOIS

A meeting of the directors of the Bond County Telephone Company was held in the State Bank of Hoiles & Sons, when business concerning the company was transacted. The out-of-town directors present were C. H. Rottger, the general manager of the Centralia Union Telephone Company, and A. J. Parsons and C. M. Katterjohn, all of Springfield.

Application has been made to the stock exchange to list American Telephone and Telegraph Company $39,550,600 additional capital stock, to be issued on and after November 1, 1917, in exchange for present outstanding subscriptions receipts for capital stock.

Saybrook Telephone Company, Saybrook, capital, $16,000; incorporators, J. A. Brown, S. A. Brown, Rex Brown.

INDIANA

A force of linemen is now working in Brazil for the Central Union Telephone Company, installing new wires between Terre Haute and Indianapolis, to take care of the greatly increased business. A new arm has been added to the poles, carrying ten additional wires, and a big cable containing fifteen pairs of wires will also be installed. The cost of installing copper wires with the present prevailing prices of this metal is said to be enormous.

The annual meeting of the Farmers Mutual Telephone Company was held in the grand jury room of the court house, at

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Columbia City, a large number of stockholders being present. The Farmers Mutual Telephone Company has 1,862 telephones in service. The total collections for the year were $22,124.90, and the cash balance on hands at the close of the year ending September 30, was $1,480.75. The company has redeemed $19,375 worth of bonds and has yet outstanding $10,900. The concern has done well under the officership which has remained the same for several years and the stockholders are highly pleased with the management by R. R. Scott. The directors were re-elected for the ensuing year as follows: Albert A. Bush, Union township; Clinton Wilcox and W. H. Carter, Columbia township; Thos. Jellison, Cleveland; E. E. Rindfusz, Richland; Mel Blain, Troy and Etna; Isaac Humbarger, Thornecreek; A. J. Mullett, Washington; Irvin Kreider, Smith; Jacob Kaufman, Jefferson. The officers chosen were A. A. Bush, president; E. E. Rindfusz, vice-president; Clinton Wilcox, secretary; W. H. Carter, treasurer; R. R. Scott, manager.

IOWA

The annual meeting of the Wilton Telephone Company was held at the Union Savings Bank parlors. The following officers were chosen for the coming year: President, Dr. A. R. Leith; vice-president, Fred Maurer; secretary, H. E. Nicolaus; treasurer and manager, W. D. Harris. Directors, W. D. Harris, H. E. Nicolaus, J. H. Wacker, Fred Maurer, George Bannick, C. H. Wilson, A. R. Leith, D. E. Smith.

Mud Creek Telephone Company is the name of a new corporation which filed papers at the county recorder's office in the court house. The principal place of business of the new corporation will be Stockton. It will accumulate no profits and has no capital other than that contributed from time to time by members to build, maintain and manage the plant. The company is to operate in Cedar and Scott counties for the exclusive benefit of the members who automatically become members of the corporation. The officers of the new company are: John Dohrman, president; Henry Klahn, secretary and treasurer. The officers, with Henry Fellner, constitute the board of trustees. The incorporation is for a term of twenty years unless sooner dissolved and all members have a vote in its affairs. The line is intended as a farmers' mutual telephone system and will be operated in Cleona and Farmington townships.

KANSAS

The directors of the Hiawatha Mutual Telephone Company held a meeting. Frank D. Shaw, the vice-president, was elected president to succeed the late William Morisse. John G. Kale was elected vice-president. Mr. Kale is also general manager of the company. The finances of the company were reported in splendid condition, considering the high cost of materials.

MICHIGAN

The Michigan State Telephone Company will expend $20,000 in improving the facilities between Grand Rapids and Kalamazoo. The new equipment will include two additional copper wires and a phantom circuit.

The Kingston House Telephone Company, capitalized at $10,000, will take over the telephone property of John Burns at Kingston. The new company will be closely allied with the Valley, but will also have Bell connection.

NEBRASKA

The regular annual meeting of the stockholders of the Farmer's Telephone Company was held at North Bend. The attendance was comparatively small. Peter Bauer of Scribner and William Rettig of Glencoe were elected directors, to succeed A. J. Hasson of Dodge and Henry Spath of Scribner. The members of the board who hold over are Fred Howe, Thomas H. Fowler and C. L. Kelly of North Bend, J. F. Drenguis and Lee T. Chapin, Scribner; Henry Tank, Fremont, and Charles Lenneman, Snyder. The reports of the officers showed the affairs of the company to be in excellent condition, and several improvements, including a new telephone exchange building, at North Bend, had been added.

The Gage County Independent Telephone Company, which has a membership of 611, held its annual meeting at Blue Springs, with 206 stockholders present. A dividend of 10 per cent was declared and the sum of $3,821 will be retained in the treasury for expenses the coming year. These officers were elected: President, J. H. McPherson; treasurer, F. C. Patton; secretary and manager, S. F. Roderick; auditor, Virgil Trump.

NEVADA

Reconstruction of the toll line from Hazen to Wadsworth was decided upon by the Churchill County commissioners. The line has been badly in need of repairs, and has been regarded as an important source of revenue to the county's telephone company.

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OHIO

At a meeting of representatives of the Ohio Independent Telephone Companies' Association, District No. 1, Frank A. Knapp, manager of the Bellview Telephone Company, was reelected vice-president. Herman A. Hagerman, secretary and treasurer of the Black River Telephone Company of Lorain, was reelected secretary.

OKLAHOMA

W. H. Lucas of Cement has purchased the Loco telephone exchange from Chester M. Wood, who has been called to military service. William Bennett, Henry Mullin and Claude Wyatt were the Loco boys who went to Camp Travis with the Stephens County contingent.

PENNSYLVANIA

Final tests have been made and there is in operation between Philadelphia and Atlantic City an aerial telephone cable which, considering its length and capacity, is equaled only by the underground cable construction which connects Boston, Providence and New York with Philadelphia, Baltimore and Washington. Bell Telephone communication with Atlantic City has heretofore been maintained by means of two pole lines, carrying open-wire circuits. These two open lines have, during the stormy periods of the year, been subjected to frequent damage; and the more severe sleetstorms have on occasions necessitated the rebuilding of miles of line and rave resulted in occasional interruptions of service between Philadelphia and the seashore points. The new aerial cable has been constructed by the Bell Telephone Company of Pennsylvania to relieve this condition. The work entailed an extra expense of $600,000. With the completion of this cable, the extent of absolutely stormproof toll service from Philadelphia embraces, in addition to the Atlantic coast cities reached by the Baltimore-Washington subway, all of the territory suburban to the city, as well as the main line to Malvern, Norristown, Chester, Wilmington, Ambler, Bristol, Trenton, Camden, Woodbury, Riverside and the New Jersey seashore city that is now added.

Because Blue Ridge Summit is taking rapid strides in population and telephone growth, nearly $4,000 will be spent by the Bell Telephone Company of Pennsylvania for aerial cable and toll entering cable.

SOUTH CAROLINA

The little town of Taylors, located on both the Southern and P. & N., between Greenville and Greer, is to have a telephone exchange. The proposed capital stock of the telephone company, which will be known as the Taylors Telephone Company, will be $1,000. The stockholders of the new company are: J. F. Freeman, W. Y. McDaniel, C. C. Hammett, O. W. Garrett and Robert Woodside.

VIRGINIA

The Gretna Telephone Company, Gretna, capital $5,000. Object, to operate a telephone line. R. T. Ramsey, president, and A. C. Quarles, secretary and treasurer, both of Gretna, Va.

WASHINGTON

Kahlotus & Page Telephone Company, Kahlotus, $2,500; John Steele, R. J. Cildeland, E. C. Kline.

WEST VIRGINIA

Summersville Telephone Company, Summersville, chief works in Nicholas County; authorized capital stock, $5,000. Incorporators: Joseph F. Sebert of Enon, George A. Rader of Gilboa, John W. Murphy of Deepwell and R. W. Sawyers of Canvas.

WISCONSIN

Articles of incorporation of the Seymore-Shiocton Telephone Company, which places the capital stock at $10,000 have been filed. The Seymore-Shiocton company has been in existence for some time, but the incorporation was not effected until September 5. The incorporators are William Wallen and Henry M. Kimberly of Oshkosh and C. J. Jackson of Seymore. The company operates lines between Seymore and Shiocton and in the city of Seymour.

Additional telephone circuits between Milwaukee and Oshkosh, and between Milwaukee and Appleton, are provided for in an appropriation of $17,500, recently authorized by the Wisconsin Telephone Company. This construction work is made necessary by the steady increase in traffic. It involves placing of poles, stringing of wire, and additions to the switchboards in the central offices. The new equipment is expected to provide adequate telephone facilities for some time to come, and will be ready for service during December, 1917. Besides the work planned by the Wisconsin Telephone Company, the American Telephone and Telegraph Company is to build additional circuits between Milwaukee and Chicago in order to complete direct circuits between the latter city and Appleton and Oshkosh.